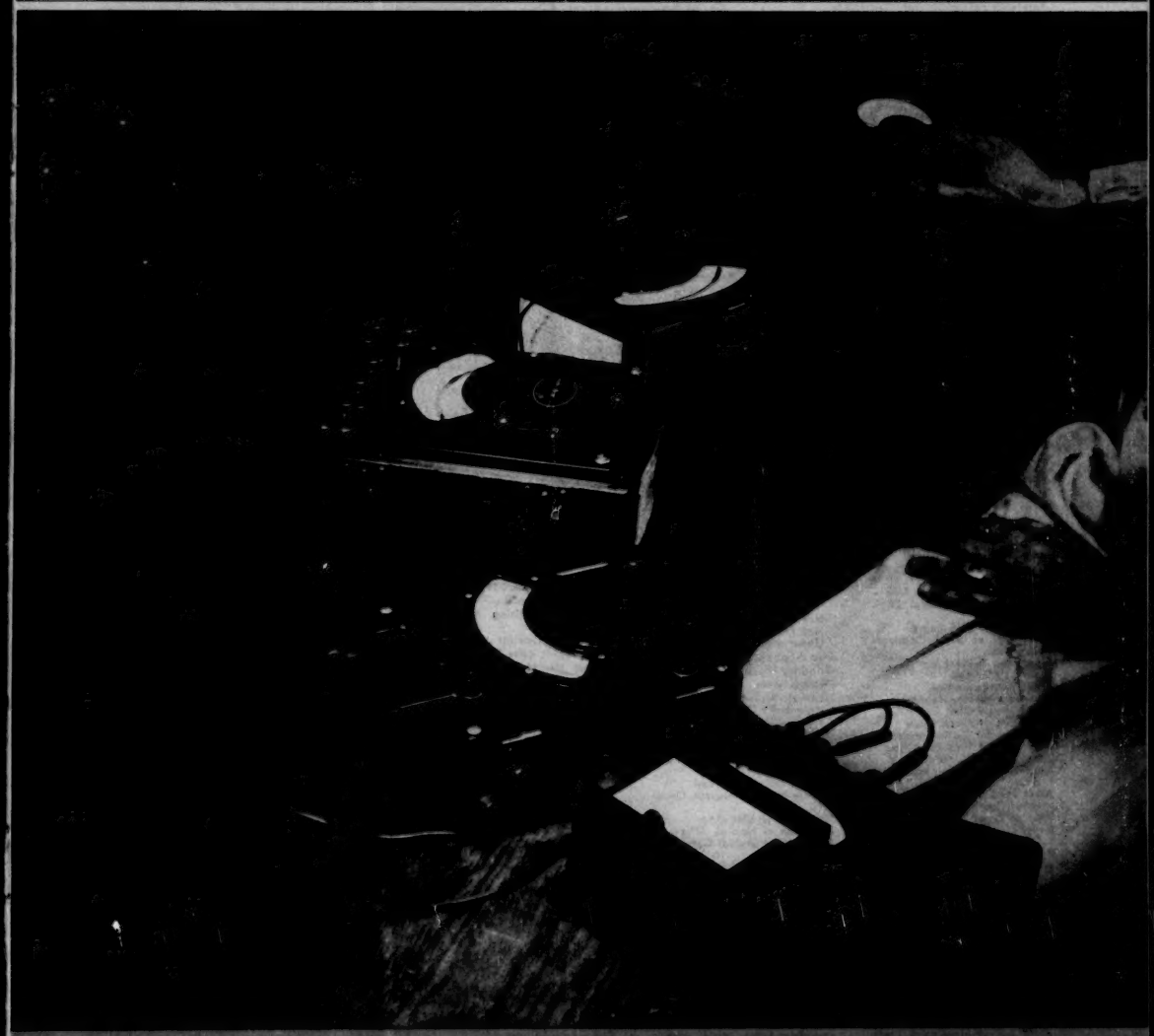
Standardization

News Magazine of the American Standards Association, Incorporated



SPECIAL INSTRUMENTS ISSUE

FEBRUARY 1931

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Marginal Notes

The Instrument Standard and Public Relations—

"Public relations in action"—this is what Vice Admiral G. F. Hussey, Jr, managing director of the American Standards Association, calls standardization. If he needs an example to prove his definition he can find none better than the standard featured in this issue—the American Standard for Electrical Indicating Instruments, C39.1-1951.

This standard represents good commercial practice; more than that, however, it codifies for practical use the science of instrumentation which has been developing ever since such men as André-Marie Ampere made the use of electricity possible.

Dr H. B. Brooks, instrument specialist at the National Bureau of Standards until his retirement; Dr F. B. Silsbee, present chief of the Bureau's Division of Electricity and Optics; Everett S. Lee, of the General Engineering Laboratory; and H. C. Koenig of the Electrical Testing Laboratories have brought their knowledge of instrumentation into its development.

These electrical instrument experts sat at the conference table with leading instrument authorities in the manufacturing field—John H. Miller and F. X. Lamb of Weston; I. F. Kinnard and D. B. Fish of General Electric; D. A. Young, Westinghouse; E. E. Fenstermaker, Roller-Smith. Their viewpoints were checked by representatives of companies that use instruments to maintain the accuracy of their operations, and of testing laboratories charged with the responsibility of checking instruments as they are manufactured—G. F. Walter, Public Service Electric and Gas Company; A. Daschke, Bell Telephone Laboratories; E. E. Scott, Armed Services Electro Standards Agency; and Claude E. Ware of the Electrical Supplies Committee, Federal Specifications Board.

Their cooperative exchange of ideas has resulted in placing at the disposal of manufacturers a codifica-

tion of specifications and tests which represent their customers' needs. It gives users of instruments a reference document that is easy to follow in selecting one instrument and checking its performance for their job. It gives testing laboratories a nationally recognized reference for use in checking the instruments that come to them for test.

Electric Ranges—

Also representative of "public relations in action" are the first American Standards for electrical appliances used in the home. Through American Standards Association procedure, home economists, and consumer groups sat with manufacturers and public utilities to determine what performance the homemaker needs in an efficient electric range or water heater: The two American Standards for electric ranges and electric water heaters are the result of their work.

R. C. Sogge, chairman of the NEMA Codes and Standards Committee, says, "We hope that these standards will be accepted and used by all parties interested in the manufacture, distribution and use of electric ranges and electric water heaters, as they will provide the most satisfactory basis for further improvement in standards which contribute so much to the American standard of living."

Our Front Cover

These portable instruments—voltmeters, ammeters, and wattmeters—have been collected for a laboratory test on the performance of lamp ballasts. Picture on page 43 shows the entire test setup. Instruments from left to right are: Voltmeter used to standardize supply voltage; voltmeter used to measure voltage across standard lamps; ammeter for measurement of lamp and preheat current; wattmeter for measurement of lamp and supply power input; vacuum tube voltmeter to measure voltage drop across a calibrated resistance to calculate heat values of lamp current. For assurance that instruments used will do the job required, laboratories rely on American Standard C39.1-1951. Photo Courtesy Electrical Testing Laboratories, Inc.

Opinions expressed by authors in STANDARDIZATION *are not necessarily those of the American Standards Association.*

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Standardization is dynamic, not static. It means not to stand still, but to move forward together.

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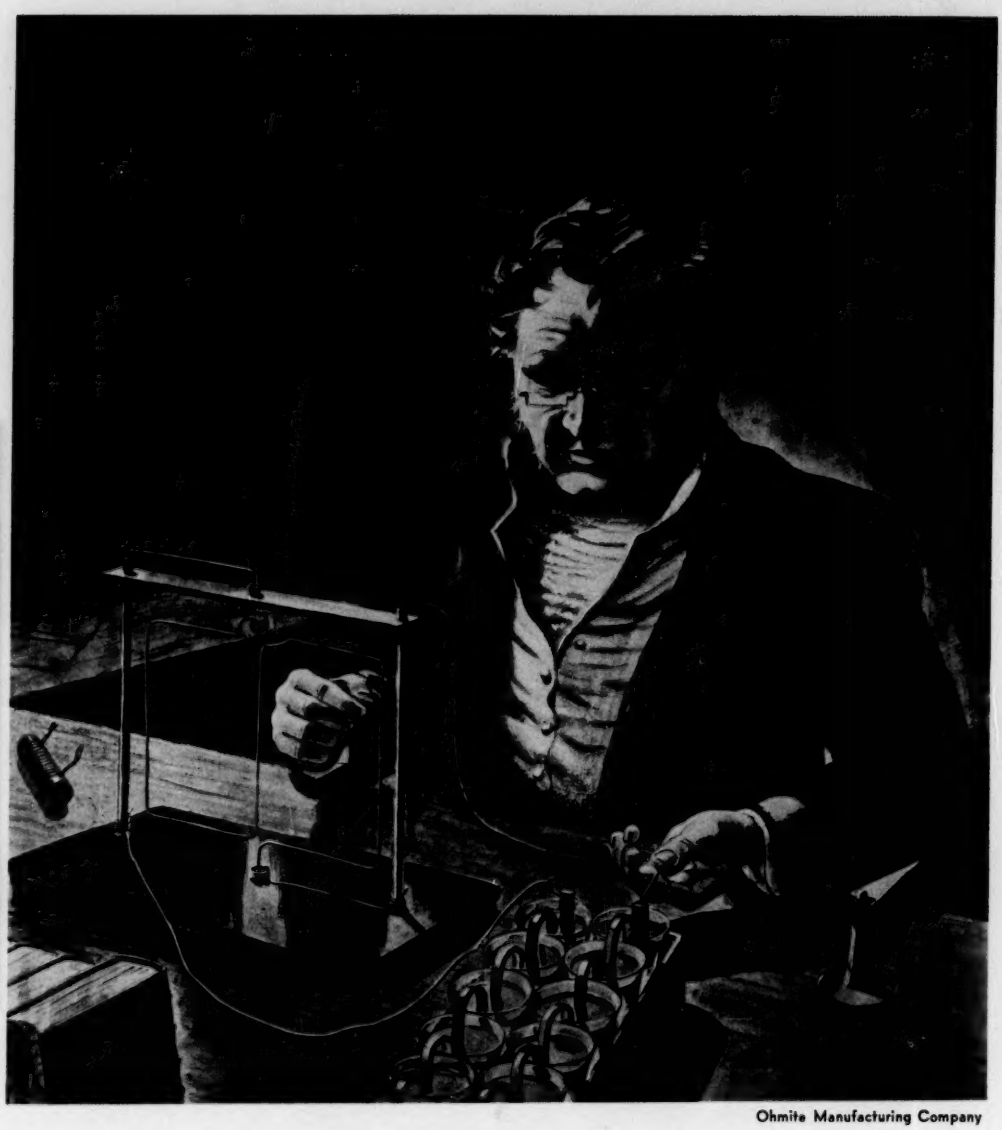


Ohmite Manufacturing Company

André-Marie Ampere (1775-1836) is called the "Newton of Electricity." Inspired by the experiments of Oersted, he constructed the first solenoid, and the first electromagnet. In 1820 he created a new branch of physics—electrodynamics—and established its basic laws. Today his name is used as the symbol for the unit of electric current.

LABORATORY INSTRUMENTS
Join the Panel and Switchboard Types

Instruments as used in the laboratory and for portable testing have been added in the revised specification for electrical indicating instruments

by John H. Miller

Vice President and Chief Engineer, Weston Electrical Instrument Corp; Chairman, Subcommittee I, Committee C39

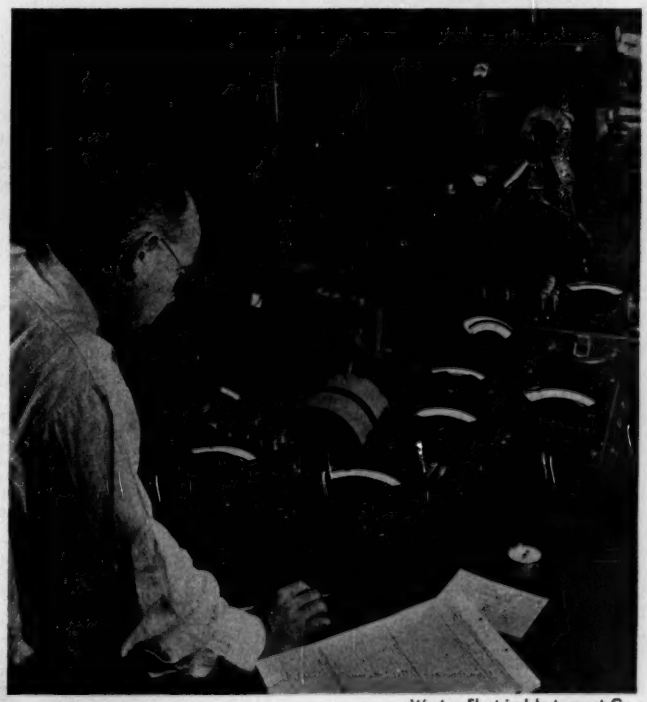
IN electrical design laboratories, on the production floor, in inspection departments, the performance and quality of electrical devices is determined by reference to electrical indicating instruments. The performance of more than a million portable and laboratory instruments now in use acts as industry's guide to the satisfactory operation of electrical equipment ranging from incandescent lamps and home appliances through the electrical tools of industry—motors, ovens, welders, plating machines — to the enormous turbo-alternators built for modern central stations.

Despite the significant part they play in control of performance and operation of manufactured parts and equipment up to the present time, laboratory technicians, inspectors, and scientists have had no nationally recognized performance criteria by which to judge the qualifications of the instruments themselves.

Now, the revised edition of the American Standard for Electrical Indicating Instruments, C39.1-1951 includes for the first time detailed performance specifications for instruments of the portable and laboratory type. With this standard users can easily check the several types of instruments for the performance to be expected, and can determine from the listed characteristics and limits the accuracy class for any particular requirement. In some cases the limitations given have been previously unstated and the instruments used in positions or locations or under conditions for which their prime accuracy cannot be obtained. Thus it is hoped the standard will result in better conditions of use as well as improved basic performance.

In 1949 the original edition of American Standard C39.1 was completed. The committee which produced it was charged with considering panel and switchboard types of instruments. These had been covered by prior specifications to some extent, particularly the Navy Specification 17-I-12 and the Emergency War Standard C39.2-1943, and the committee had a background on which to build.

While some thought was given portable instruments, it was realized that little background existed and that new fields would have to be explored and specified. Accordingly, the committee decided to concentrate on the specifically assigned task and presented the standard to the sectional committee in 1948, with the suggestion that the standard be brought to an interim completion on panel and switchboard instruments. The



Weston Electrical Instrument Co.

Data collected by this battery of laboratory instruments on the new design alternating-current motor (background) leaves little chance of slipup.

PLATE 31

Tabulated Detailed Requirements for Portable Alternating-Current Electrical Indicating Instruments

Voltmeters, Single and Multiple Range

ITEM	UNITS	REQUIREMENTS					REFERENCE
1. Rated accuracy[10]	percent of full scale	0.1	0.25	0.5	1	2	3.21
2. Scale length, min	inches	12	5	3.2	2.5	1.5	3.13
3. Mirror scale		yes	yes	yes	not req	not req	
4. Knife edge pointer		yes	yes	yes	yes	not req	
5. Position influence (½ rated accuracy for maximum position deviation indicated)	degrees[1] from horizontal	note 1	1	2	5	10	3.12.4
6. Damping factor, min		2.5	3	3	2	1.5	3.19
(Overshoot, max)	(percent)	(40)	(33)	(33)	(50)	(67)	(3.18, 3.19)
7. Response time, max	seconds	10	5	5	2.5	2.5	3.20
8. Loss, max							
(a) 150-volt single range	va	not limited	10	10	10	5	3.23
(b) Any range except 150-volt single range	va	not limited	25	20	15	10	3.23
9. External temperature influence (with ± 10 C variation from +25 C), max[8]							
(a) Single range 75 volt min	percent	0.05	0.15	0.3	0.3	0.8	3.12.1
(b) Any range or ranges (except (a) above)[7]	percent	0.1	0.25[2]	0.5[2]	0.5[2]	1.5[2]	5.1
10. Sustained operation influence, max[6, 8]							
(a) Single range, 75 volt min	percent	0.1	0.2	0.3	0.5	1.0	3.12.2
(b) Any range or ranges (except (a) above)[7, 9]	percent	0.2	0.4	0.6	1.0	2.0	3.12.2
11. External field influence (if designated as being of the magnetically shielded type), max[8, 11]	percent influence in 5 oersted field	0.5	0.5	2	5	5	3.2.2 3.12.3
12. Dielectric test	volts	1000	2600	2600	2600	2600	5.6
13. Leads	ohms	note 3	note 3	note 3	note 3	note 3	
14. Self-contained rating[4] max	volts	300	800	800	800	800	
min	volts	75	15	3	1.5	—	
15. Frequency influence (54-66 cycles inclusive, for 60-cycle instruments), max[8]	percent	0.05	0.1	0.2	0.5	0.5	3.12.6
16. Difference between readings on 60 cycles a-c and mean of reversed d-c values, max[8]	percent	0.05	0.15	note 5	note 5	note 5	
17. Magnetic platform effect, max[8]	percent	0.05	0.125	0.25	0.5	1	3.12.9

NOTES:

1. To be leveled with means provided. Portable instruments rated at 0.1 percent accuracy shall be provided with a means for determining and obtaining a suitable degree of levelness.
2. Applies to single-range instruments whose range is 15 volts or higher or multirange instruments with a range ratio not exceeding 5 to 1.
3. All a-c voltmeters are calibrated to allow for 0.026 ohm lead resistance. Where a lead resistance of 0.026 ohm influences accuracy to a degree equal to ½ of the accuracy rating of the instrument, leads shall be supplied with the instrument and shall be used to obtain rated accuracy.
4. Multirange combinations are limited in range coverage in certain design types, and it should be pointed out that to obtain wide coverage in a single instrument, special arrangements may be required.
5. It is not required that these instruments be operable on direct current.
6. This maximum value shall not be exceeded at any time within six hours.
7. This requirement is limited for multiple-range instruments to those having a ratio of highest full scale range to lowest full scale range of 4 to 1.
8. In the case of instruments having nonlinear scales, these values shall apply only in those portions of the scale where the divisions are equal to or greater than two-thirds the width they would be if the scale were evenly divided.
9. To be taken at 80 percent of full scale value.
10. No separate tabulation is shown for currently available instruments of rated accuracy class 0.75 or for other intermediate classes occasionally used. In the interest of standardization the classes have been limited to those shown.
11. This allows for the purchase of instruments not designated as magnetically shielded, as a concession to present manufacture or particular characteristics. Such instruments are not limited in external field influence.

One of the tabulated data sheets that make American Standard C39.1-1951 on Electrical Indicating Instruments easy to use.

thought here was that the work already accomplished would be quite useful to industry and it seemed much in order to make it immediately available, particularly in view of the fact that a document on portable instruments would probably require several years in the making. It also seemed in order to ask the sectional committee for specific authorization to complete such a standard on portable instruments because such coverage was a bit vague in the original assignment. Everett S. Lee (General Electric Company), chairman of the committee, immediately put the question, and the sectional committee approved.

Portable Instrument Standard Considered

Shortly thereafter the first meeting was called to consider specifically the portable instrument standard. Throughout the previous discussions on switchboard and panel instruments most everyone had the portable instruments in mind and there was much discussion at the committee luncheons as to how we might approach the subject. With this background the approach to the portable instrument standard was fairly straightforward and it was generally agreed that the endeavor should be to tabulate in compact form the specific requirements in somewhat the same fashion as had previously been used for the panel and switchboard instruments.

However, it was obvious that there was no standard for outside dimensions and the instrument casings actually varied from one manufacturer to another in shape, size, material, and appearance. The common denominator, however, appeared to be the accuracy class and scale length. Tabulations, therefore, were started for the several types of instruments against accuracy class.

As to types, there are a-c voltmeters and ammeters, d-c voltmeters and ammeters, and wattmeters. It was decided to omit the more complex and less used types such as power factor meters, frequency meters, and the like, and concentrate on the more common kinds.

The accuracy classes were selected from those offered by the various manufacturers and without too much regard to such prior limited listings as had been made. Some compromise was needed to secure common classes between manufacturers but such compromise was generally forthcoming.

Study Results

The result of this study was a series of four tabulations, one of which is shown on the facing page. This plate is printed here to indicate the possibility of tabulating the requirements whereby a very great deal of information can be placed on a single sheet to the end that a much better standard can be made available for those using such information in their daily work.

Some details may be of interest. It was found that some manufacturers were producing portable instruments to certain values of rated accuracy where, however, that accuracy would not be maintained when connected to a circuit for a long period of time. In many instances the demand for multiple range instruments had resulted in limitations of power dissipation to the point where working errors sometimes exceeded the accuracy rating. Representatives of the utilities and of laboratories using the instruments were quite critical of the manufacturers and at one time it looked as though a stalemate would result. Finally a new influence was proposed, "Sustained Operation Influence," stated to be the change caused by energizing the instrument over extended periods of time over and above the indications of the instrument when first connected to the circuit. After much discussion, values were assigned for this sustained operation influence. It is believed that this is the first time that recognition has been given to working errors of portable instruments.

Platform Influence

In a somewhat similar fashion the matter of the effect of placing the instrument on an iron table came to the fore. Certain types of instruments appeared to be affected by adjacent iron and, accordingly, "Magnetic Platform Influence" was listed, defined, and limiting values stated.

The matter of positioning of portable instruments always has been a question in the past. Portable instruments are designed for the high accuracy which can be obtained with the instrument horizontal, or, more importantly, with the axis of the moving system vertical. In this position minor changes in the balance of the moving element are eliminated. But there never had been a clear statement in this regard. Users have persisted in blocking up precision instruments at an angle to facilitate reading in some particular laboratory test to the evidently unrealized detriment to overall accuracy. Making a ¼ percent accuracy instrument more readily seen at the expense of a possible 1 percent error is frequently attempted and the instrument maker blamed for the error.

"Position Influence"

"Position Influence" was, therefore, defined. As might be expected, this was a graded value whereby the highest accuracy instruments must be leveled as exactly as possible "with the means provided"; usually such instruments are provided with a small bubble level. But instruments having a 1 percent rated accuracy can be tipped as much as 5 degrees from the horizontal without exceeding the established criterion.

Other items tabulated have been used before in one form or another but, again, specific values had not been given and were utlimately assigned by dint of much discussion and the inevitable give and take and compromise in a working committee.

New Document

When the work was better than half complete, J. W. McNair, American Standards Association staff, reported that the printing of the original panel and switchboard standard was rapidly being exhausted and he recommended that instead of bringing out the portable instrument standard

(*Continued on page* 58)

How a Large Electrical Utility Uses 1951 Instrument Standard

by G. F. Walter
Electrical Division Chief,
Public Service Electric and Gas Company

MANY switchboard and portable instruments are purchased each year by the Public Service Electric and Gas Company of New Jersey for new installations and replacements. Approximately 11,000 electrical switchboard instruments are constantly in use in our power plants and substations. Day and night they help to provide a constant dependable source of power to our customers and supply information for the efficient operation of the generation, transmission, and distribution facilities. In addition, approximately 3,000 portable instruments are distributed throughout the various departments of our Company and are carried by technicians on their tours to make special tests, to check the accuracy of or to calibrate installed instruments, and to test various components of the system in an effort to anticipate and prevent incipient power failures.

The constancy and adequacy of the service we provide our customers depends greatly upon the continued accuracy, in operation, of the station instruments. In order that we may be able to rely on their results, they are calibrated periodically against high quality portable instruments.

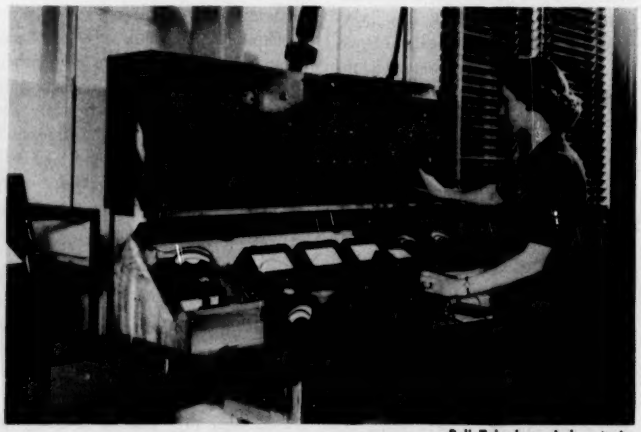
In our Laboratory we are equipped with primary electrical standards and precision master instruments. These instruments are used to make scheduled tests on all portable instruments, basic acceptance tests on new types of instruments, and detailed tests on new instruments to insure their meeting purchase specifications. Thus we are able to maintain a high degree of accuracy on all instruments from the customer's premises back to the generators.

Our instrument and test engineers have made a detailed study of electrical instruments particularly from the viewpoint of operation and test. However, policy and good practice dictate that the American Standard for Electrical Indicating Instruments be consulted in detail for all acceptance and detailed tests on new indicating instruments. Under no condition is memory or the understanding of any individual or group permitted to substitute for the written word of the standard.

The 1938 edition of the standard is presented in a prose form and various non-consecutive paragraphs or sections many times refer to the same general point or test; because of this, much time has been spent unproductively in leafing through this edition and studying many of the paragraphs in selection of specific tests and their method of application to a particular instrument. The new 1951 edition, for the first time, tabulates all the detailed requirements for each type and class of switchboard, panel, and portable instrument. Also listed in the tabulation are specific references to the written definitions and instructions that pertain to the individual requirements. The written matter is presented in a direct and straightforward style with a noticeable effort to eliminate ambiguity. The presentation of the specification in this ready-reference form will eliminate uncertainties as to a possible oversight of some important characteristic as well as what may or may not be expected of each type and class of instrument.

How important this can be is illustrated by an experience of one of the Armed Services, which recently came to our attention. Operating in one of our northern states during the winter, the Service engineers were disturbed to find an abnormally large error apparently in their electrical instruments. Attempts to adjust the instruments were of no avail. In an urgent call to the manufacturer they complained of a 4% error whereas the instrument was listed in the 1% class. Investigation by the manufac-

(*Continued on page* 54)



Bell Telephone Laboratories

Meter test set for checking accuracies and other characteristics of electrical measuring instruments in use in the Bell Telephone Laboratories.

Progress on Recording Instruments

by H. C. Koenig
Manager, Electrical Laboratory Services, ETL, Inc
Chairman, Subcommittee on Recording Instruments,
Sectional Committee on Electrical Measuring Instruments, C39

EVERY effort is being made to write a standard for recording instruments that will compare favorably with the American Standard for Electrical Indicating Instruments. Two subgroups, whose membership is well diversified and includes men with considerable experience in the recording instrument field, are active under subcommittee 2 of Sectional Committee C39. One, on Classifications and Requirements, is working under the chairmanship of D. A. Young, Westinghouse Electric Corporation. The other, on Definitions, has E. E. Scott, Armed Services Electro Standards Agency, as chairman.

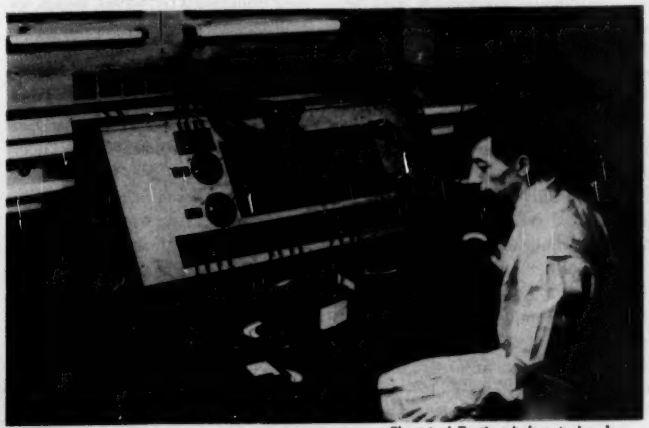
The immediate objective of these committees is a revision of AIEE Standard No. 40. The detailed requirement sheets of the American Standard for Indicating Instruments are being used as a guide in presenting the material in the new edition.

It is planned to move slowly in this revision. No attempt is being made to cover the entire field of recording instruments at this time. The immediate objective, on the other hand, is to lay the groundwork with specifications and tests covering most of the recording instruments but for the present to deal specifically only with the direct-acting type and to cover only the ordinary run of instruments —ammeters, voltmeters, wattmeters, etc. Once this objective is accomplished, it will be possible to move on to broader fields.

The history of standards for electrical recording instruments started in 1933 when the American Institute of Electrical Engineers issued a Report identified as No. 40. At that time the chief purpose was to define the terms and conditions which characterize the rating and behavior of the recording instruments. Some years later the Instruments and Measurements Committee of the AIEE undertook a revision of No. 40; in July 1947 this revision was eventually approved as AIEE Standard No. 40.

Although the revised standard was an improvement over the original report, in the writer's opinion it left much to be desired. For years the writer, with Dr H. B. Brooks and Dr F. B. Silsbee of the National Bureau of Standards, and others, tried to "put some teeth" into the standard, to include some definite performance requirements. These efforts met with little, if any, success. The standard, in the main, still consists of a list of definitions and terms. It appeared to be hopeless to expect anything more than this for some years to come.

However, something has happened during the past year or so which makes it appear that the matter is not quite as hopeless as the writer had felt it was. This is approval of American Standard for Electrical Indicating Instruments, issued by the American Standards Association first as C39.1-1949, and now available in the revised and enlarged 1951 edition. This standard did for indicating instruments just what should have been done for the recording instruments in the revised AIEE Standard No. 40. In this 1951 edition, for the first time, the indicating instrument standard contains detailed-requirement sheets covering the performance of switchboard, panel, and portable instruments. With the development of this standard, the thought occurred to those of us who are concerned with recording instruments, that if it can be done for indicating instruments, why not for recording instruments? The writer promptly recommended to the Instruments and Measurements Committee of the AIEE that, in light of what had been accomplished in the indicating instrument field, we again revise Standard No. 40. This recommendation was made even though Standard No. 40 had only been issued a few years ago. This revision is being done by Subcommittee 2 of ASA Sectional Committee C39, as indicated above. It is hoped that this revision will be published before the end of 1951. It is sure to be welcomed by every user and manufacturer of recording instruments.



Electrical Testing Laboratories, Inc.

Performance of lamp ballasts is checked with portable instruments by operating the ballasts with standard lamps and comparing results with tests of reference ballasts operated with the same lamps.

What Is Instrument "Accuracy"?

New York Section, Instrument Society of America, devotes session to discussion of "Accuracy Rating"

"ACCURACY" undoubtedly has been given more consideration in preparing standards for indicating instruments than any other problem. Despite the fact that agreement has been reached in the 1951 edition of American Standards C39.1, the question of "accuracy" is still being discussed by committees working on recording instruments. That this is not entirely an academic question but one of wide general interest was shown in a recent meeting of the New York Section, Instrument Society of America, devoted to the subject. Animated discussion from the floor gave evidence of widespread general interest.

Even the definiton of "accuracy" in the dictionary starts trouble in so far as instrument accuracy is concerned, H. Koenig, chairman of Sectional Committee C99's subcommittee 2 on recording instruments, told the meeting. Mr Koenig was the principal speaker. His presentation of the problem is given below:

The Problem of Accuracy (H. Koenig, Electrical Testing Laboratories)—

The question of accuracy or accuracy rating, or whatever it may be called, has always been controversial. Even the definition of "accuracy" in the dictionary starts trouble in so far as instruments are concerned. The definition indicates that "accuracy" has something to do with correctness, exactness, and precision. You can easily see what happens in the case of instruments if the word is used to indicate correctness.

It would sound odd to call an instrument a 20 percent or a 110 percent instrument. In the present classification, indicating instruments are listed according to accuracy: 0.1, 0.2, 0.5, 1, and 2 percent instruments. Would you call a 2 percent instrument correct? How about a 0.5 percent or even a 0.1 percent instrument? Are such instruments correct in the dictionary sense of the word?

This question is recognized by the British when they avoid the word "accuracy" almost completely in their specifications and talk about "limits of error." It was also recognized when we drew up the Code for Electricity Meters years ago and specified limits in terms of Deviation from Reference Performance. It would sound awkward to say that the accuracy of a watthour meter is 102 percent just as it would sound silly to say that Ivory Soap is 102 percent pure.

Full Scale Deflection

The usual method of specifying accuracy of indicating and recording instruments is in terms of full-scale deflection. The definitions for accuracy vary all the way from a 35-word clause in the Joint Army-Navy Specification JAN-I-6 to a section in American Standard C39.1-1951 which, including the notes, runs into hundreds of words. The definition given in terms of full-scale deflection has the advantage of simplicity and is convenient in its application to a wide variety of instruments. In many cases, however, it does leave much to be desired. Recognizing that numerous special instruments, such as frequency meters, power-factor meters, and many instruments having nonlinear scales, could not be included in the definition for accuracy, Sectional Committee C39 has included notes to cover these instruments.

There is a rapidly increasing use of instruments requiring special scales, however, where this method of defining accuracy is not so desirable. It is fine when readings of the instrument are made at the upper end of the scale. Here the accuracy of indication in terms of itself is about as great as the accuracy given in terms of full-scale deflection. But, how about those instruments which require that the indications over most of the scale be relied upon? How about an ohmmeter? How about a wattmeter used in motor tests or water-rate tests over a range of loads? Read a 2 percent instrument at 1/10 full-scale value. Would you like to call it 20 percent accurate? This would be an intolerable accuracy both to the manufacturer, and the user, particularly when we know that many instruments are inherently more accurate at lower portions of the scale.

I have considerable sympathy with apparatus manufacturers who protest this method of defining accuracy in terms of full-scale. They cannot tell a customer that a piece of equipment is good to 2 percent of an indicated 1/10th full scale if they are using a 2 percent instrument, when he knows that the instrument manufacturer says it is only good to 2 percent of full-scale. What is the solution? Should we, in defining accuracy, recognize two factors, one being a constant quantity and the other being stated in terms of the actual load or reading?

Two Factors

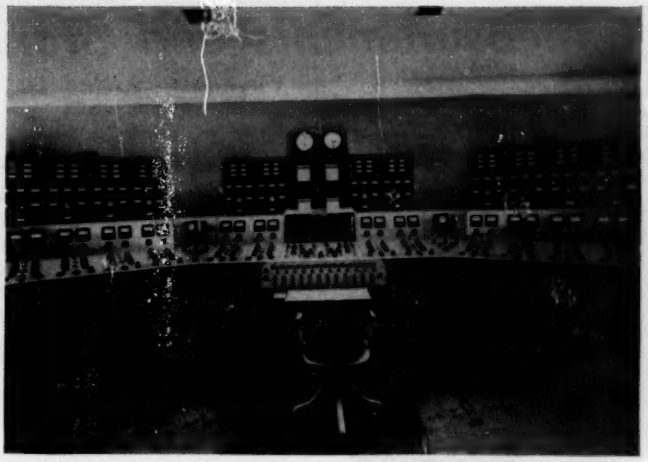
The accuracy of an instrument is usually thought of in terms of initial accuracy. The accuracy rating of an instrument is not quite as simple as this; actually it is rather complex. Someone has suggested that accuracy might well consist of two separate parts. The first would be a so-called initial accuracy. This would represent the accuracy of readings obtained under conditions of normal temperature, sine-wave frequency, no external field, and in the case of wattmeters, frequency meters and other

instruments with potential circuits, at rated voltage.

The second half of the accuracy rating would be defined under conditions of a specified departure from the normal. For instance, in the case of an alternating-current voltmeter operating under a condition which we will call "a," additional tests would be made under variations of ambient temperature, frequency, and external field. The accuracy of the instrument would be given as a summation of the initial accuracy plus the maximum errors obtained under the second set of conditions. The accuracy might then be expressed as 0.5 a 1.5. If tests were made under a second set of conditions "b," the accuracy might again be expressed by 0.5 b 2.0. This method has always seemed to me to be rather complicated. In American Standard C39.1-1951 these "other than normal" conditions were dealt with in a section devoted to influences rather than in the accuracy definition.

Rated Accuracy

At the present time, instruments are usually classified in this country in accordance with their rated accuracy. This method is used in the 1951 edition of American Standard C39.1. This classification often gives a misleading picture of the ability of an instrument to do the job as well as the manufacturer rates it. A few years ago during the early stages of the revision of C39, I had occasion to look into the cover of a voltmeter of well-known make. The manufacturer had indicated that, if the instrument were to be used continuously in a circuit, the accuracy might change as much as 0.6 percent. Being somewhat disturbed over this, I ran a series of tests on a number of indicating a-c voltmeters and wattmeters in my own laboratory and found that errors due to continuous use of the instrument reached as high as 0.6 and 0.7 percent. These figures were checked by other laboratories. This problem has been treated in the C39.1 standard by setting up values for sustained operation influence and distinguishing between single and multiple range instruments.



Westinghouse Electric Corporation

Six-inch switchboard type indicating instruments (per ASA C39.1-1951) are used in Aluminum Company of Canada's Saguenay River hydro-electric development—largest in the world in a single power house.

With an error of this magnitude is the manufacturer justified in classifying such an instrument as a 0.1, a 0.2, or even a 0.5 percent instrument? I claim that to classify such instruments as 0.1, 0.2, or 0.5 percent instruments is misleading. The manufacturer, on the other hand, claims that these accuracies refer to operations under normal conditions and points out that continuous operation for voltmeters and wattmeters is not normal. This, of course, is a debatable point. Many instruments owned by commercial laboratories and public utility laboratories are used in tests which make it necessary to keep the instruments in the circuit continuously. They are often used in water-rate tests where contracts require that the efficiencies of the machines be determined to perhaps 0.2 of a percent. Of what use is it to select a 0.2 percent instrument for such work if we know that inherently the instrument might have an error of 0.6 of a percent if used continuously?

Other Problems

It is not too difficult, sitting in committee meetings, to draw up specifications for various instruments. Unfortunately, when it comes to applying the specifications or standards in the laboratories, numerous other problems arise. For instance, in determining the initial accuracy of an instrument, how many scale points should be tested? Should the instrument be allowed to come to an equilibrium temperature before beginning the test, or should the test be made very rapidly to avoid the development of internal heating and zero shift? Should you start the check at the upper part of scale and work down, or at the lower part and work up? Should the zero be reset at the beginning of the test only, or should it be reset during the test as each scale point is checked? In testing for effect of various influences such as those of temperature or external magnetic field, how many scale points should be tested?

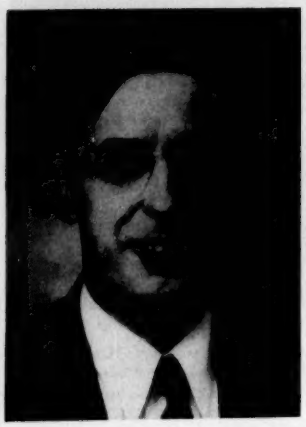
Temperature Influence

If in obtaining the external temperature influence, the zero is found to shift with change in temperature, should it be reset or should it be included as part of the temperature influence?

These are only a few of the problems which confront the test engineer. They may appear to be minor but they do present a real problem to the test engineer who is required to certify that an instrument does meet the accuracy requirements of a certain specification.

Measurements and Standardization

by Everett S. Lee



Mr. Lee, nationally and internationally known for his development work on instruments, is Executive Engineer of the General Engineering and Consulting Laboratory of the General Electric Company. He has brought his philosophy on the relationship between measurements and standardization, as expressed in this article, into his work as chairman of ASA Sectional Committee on Electrical Measuring Instruments, C39.

"WHAT is new?" is the usual greeting of the engineer, for it is the engineer who brings forth the new. In the new American Standard for Electrical Indicating Instruments, the engineers of ASA Committee C39 have brought forth the new in a most outstanding contribution. Together with all the characteristic information, there are plates of Tabulated Detailed Requirements covering 33 types of panel, switchboard, and portable electrical indicating instruments for general industrial use. Values of the characteristics stated in numbers are included, together with dimensions, all so clearly tabulated that he who produces for sale and he who purchases for use can have complete understanding of characteristic values in every regard. So far as we know, this is the first time such a standard has ever been produced in such detailed form.

Electrical indicating instruments have been with us for many years, and their standardization goes back to the early days of the American Institute of Electrical Engineers. I personally knew of this work and of the engineers who gave their time to it from about 1913 and on. Previous to this, standards had been early recognized as essential to commerce and trade, and the abilities of the best engineers in the electrical industry had been applied to the problems of developing standards that the industry could grow in orderly progression without confusion. Dr. Steinmetz and Dr. Lamme had collaborated to bring forth the standardization of temperature classification of materials for purposes of rating electrical machinery. These were foundation stones upon which the electrical industry was built; they persist today.

ASA Founded

During the 1920's, when Dr L. T. Robinson and other great engineers were wrestling with the problems of standardization of electrical machinery, it was my privilege to be associated with them. With the growth of the electrical industry, and its expansion into every avenue of activity, there came the need for more orderly progression of standards, with all interests included, that the final result would be for all to use. Because I lived with Dr Robinson during those days when he and others were giving of their time to the founding of the American Standards Association, I had a close first-hand view of what went on during those efforts to provide a place where American Standards could be brought into being. As a result of those efforts, today we have the American Standards Association.

My own interest in standards was intensified by that experience and my active interest in standards for instruments has grown in relation to my work with the General Engineering Laboratory.

Dr Robinson founded the General Engineering Laboratory of the General Electric Company as the "Standardizing Laboratory." Measurements were its foundation. But with engineers of measurements ability, who understood the fundamentals, engineering developments were a natural; and these followed. Dr Steinmetz's Consulting Engineering Laboratory was combined with the Standardizing Laboratory to form the General Engineering Laboratory under Dr Robinson in 1919. It was in this period that standardization activities were rapidly growing to a position where they were assumed specifically by the engineers of each particular kind of electrical machinery. The ASA was formed in 1928, growing out of the American Engineering Standards Committee in 1919. Dr Robinson died in 1931.

Laboratory's Growth

The General Engineering Laboratory at that time was a measurements and development laboratory of some 40 engineers with a supporting group of development manufacturing people bringing the total to 250. Today the Laboratory is the General Engineering and Consulting Laboratory. It is a measurements and development laboratory, and numbers some 360 engineers with a supporting group of development manufacturing specialists to give a total of 1,480 people. Its home is in the familiar Buildings 5 and 37 in

(*Continued on page 60*)

"HOW BIG IS AN INCH?"

"How Big Is an Inch?" asks the title of a feature article in the January *Atlantic*. In this article, Senator Ralph E. Flanders (Vermont), has used his personal experience to tell about standards in story after story that must strike everyone in familiar terms. Senator Flanders tells a good story; he also speaks for the voluntary system of standardization in contrast to government control.

"If you control an industry's standards," Senator Flanders says, "you control that industry lock, stock, and ledger. On the day that standards become a government function and responsibility, as is now being threatened, the government will take a very long step toward the control of American industry. That is a step which will reach into every manufacturing and operating company, big and little, and consequently will affect every consumer in the country."

The solution lies in consensus, Senator Flanders declares. "Where everyone is affected by standards, everyone should make the standards." And he refers to the work of the American Society for Testing Materials and the American Standards Association to prove that voluntary standardization on the consensus principle works.

Senator Flanders sounds a timely warning. "There is now a heightened danger that the intensified pressures of war preparedness will cause the consensus principle in standards to be thrown out and War Standards to be handed down by dictate. There is a greater danger that the government, using the war emergency as an opportunity and an excuse, will not only take over full powers in standards activities but will fail to relinquish them when the emergency ends."

The Senator calls standards "basic to our industrial economy," and "more important than ever as we organize resistance against aggressive forces."

Sounding a hopeful note for the future, he declares, "When this crisis ends, we must work to achieve a higher degree of harmony and order in our world; to relieve the strain of modern living by simplification; to increase the standard of living through more efficient production of interchangeable parts in a free market. We must use standards as 'the liberator that relegates the problems that have already been solved to the field of routine, and leaves the creative faculties free for the problems that are still unsolved.'"

Senator Flanders speaks from broad exeprience. For 13 years he was president of the Jones and Lamson Company, Springfield, Vermont. He has been a designer and inventor of machine tools, and is a past president of the American Society of Mechanical Engineers. In 1944 he received the American Engineering Council's Hoover Medal for outstanding public service. He was chairman of the Sectional Committee on Screw Threads, B1, in 1943 and presided at the first international conference which led to unification of British, American, and Canadian screw threads five years later.

Reprints of Senator Flanders article can be obtained from the American Standards Association without charge.

Concrete Institute to Change Standards

CHANGES in Building Code Requirements for Reinforced Concrete (ACI 318-47) to allow for the improved properties of new-style deformed reinforcing bars complying with ASTM Specification A305, are being considered by the American Concrete Institute. This well-known ACI standard has been approved by the American Standards Association as American Standard A89.1-1948. The proposed changes, following recommendations of ACI Committee 208 on bond stress, will be voted on at the ACI's annual convention at San Francisco February 20-22.

If adopted, the changes will decrease the allowable bond stress in plain bars (including the old types of deformed bars) and increase the allowable bond stresses for the new types of bars over those previously allowed for the old types. Top bars, those having more than 12 in. of concrete under them, are assigned lower bond stresses than bars in other positions.

All plain bars must be hooked, which corresponds to special anchorage under the old provisions. The new bars develop sufficient anchorage by bond alone to correspond to special anchorage with the old type bars, resulting in less total steel required.

New developments in other forms of concrete reinforcing materials have taken place concurrently with studies that led to the development of ASTM standard A305. In line with these developments, revisions are also under consideration by the American Society for Testing Materials in standards for other types of concrete reinforcement. These include: Billet-Steel Bars for Concrete Reinforcement (ASTM A15-39; ASA A50.1-1939); Rail-Steel Bars for Concrete Reinforcement (ASTM A-16-35; ASA A50.2-1936); Axle-

(*Continued on page* 60)

Government Planning for Standardization

by Willis S. MacLeod

Mr. MacLeod is director of the Standards Division, Federal Supply Service, General Services Administration. He presented this analysis of his Division's "new government-wide role with respect to commodity standardization" (as he himself expressed it) before the Company Member Conference, November 29, 1950, during the National Standardization Conference. A description of the organization of the General Services Administration and the standards work done under its jurisdiction preceded this part of his talk. For Mr. MacLeod's discussion of this organization, as prepared for STANDARDIZATION, *see page 53, March 1950.*

THE Federal Property and Administrative Services Act placed broad responsibilities in GSA for government-wide policies, methods, and procedures covering property management and supply. This required a re-evaluation of our standardization activities to broaden their scope. We have re-examined the interdepartmental relationships and programs involved in the whole field of commodity standardization.

Prior to the passage of the Act, while the need for a government-wide program of commodity standardization had long been regarded as essential to the proper functioning of Federal supply operations, such a program had never been fully established because of lack of clear statutory authority and because of inadequate funds for staff. Certain elements of the program had been in existence operating independently. Standardization of commodities, including the elimination of unnecessary and uneconomical types, grades, and varieties of commodities has been accomplished as an incidental by-product of specifications, cataloging, and inspection operations. Federal specifications, which are widely used not only by Government but by public purchasing agencies and industry, embody a considerable degree of standardization. The Federal Standard Stock Catalog also achieved some standardization. The Commodity Standards Division of the Department of Commerce, recently transferred from the National Bureau of Standards to the Office of Industry and Commerce, makes available to the Government its Commercial Standards and Simplified Practice Recommendations, developed on request of industry and with its collaboration. The military departments have also achieved some standardization incident to their military specifications and standards work. These activities contribute to government-wide standardization but do not achieve it.

Government Commodities

The increasing importance of standardizing commodities used by the Government can be appreciated when we consider the potential benefits and savings which such a program will yield. Standardization provides, for government-wide use, standard commodities offering the greatest value in terms of cost and serviceability. However, previously no organized effort has been made to operate a formalized standardization program concentrating on those products in common use which offer the greatest savings to the Government. Nor has there been any full-fledged program to coordinate government-wide standardization activities to assure uniformity in and eliminate duplication of standardization work, to fully utilize available standards data.

GSA Program

Under the present program of the GSA these things will be done. Priority will be given to standardization projects which will provide the greatest benefits and savings to the Government. Work will be concentrated on *common-use items*, such as paper and stationery, office and janitorial supplies, paints and chemicals, furniture and furnishings, whose importance to Federal supply and the volume of Government purchases warrants standardization. In addition, closer working arrangements with activities of the military and civil departments concerned with standardization are being developed.

To cite an example or two where standardization has already been achieved:—As you know, the Federal Government, being a large user of paint, has always been acutely aware of the expense of painting and the need to keep down its cost. The ex-

traordinarily large number of colors in use by the Government made our paint supply more costly, since general handling is more expensive, and the large variety of stocks generated surpluses. It has taken a quarter of a century of varying effort to standardize the colors of paint used by the Government and the results of this effort will be available shortly. "Color Cards" for the guidance of all Departments will be issued in the near future in a color book, under Federal Specification TT-C-595—Color; (For) Ready-Mixed Paints.

Five hundred actively used paint colors were reduced to 187. By standardizing the paint colors, in addition to the resulting savings, the vexing problem of matching colors is solved. In addition to the "color cards" there will be color "chips," available to the laboratories of paint manufacturers and paint testing laboratories, of colors identical to those in the color book. The manufacturer will use the "chips" in producing the color ordered by standard reference number from the book. This standardization program will result not only in savings to the Government but also to industry.

Industry Standards

We are taking, and will take, advantage of sound standardization work which has been done by industry, technical societies, and associations and which can be applied to Federal supply, thus saving both time and money. The following example shows how the adoption of an industry standard in a Federal specification resulted in savings in money and time of deliveries. Federal Specification QQ-S-624-Alloy Steel Bars (General Purpose, and QQ-S-633—Carbon Steel Bars (General Purpose), which have been recently promulgated, supersede Federal Specification QQ-S-671—Carbon and Alloy, Steel Bars. The old Specification QQ-S-671, covered some grades which were not standard in industry, because the chemistry limits differed somewhat, and therefore, industry usually tacked on extra charges for producing them. This also caused some delay in deliveries. By adopting the standards prevailing in industry and in accordance with American Iron and Steel Institute Specifications, we have achieved government and industry-wide standardization.

These examples illustrate the steps being taken in the furtherance of our commodity standards program. Our plan is to extend the standardization of commodities, to coordinate standardization government-wide, to utilize applicable standards of industry and technical societies and associations, which will improve the Federal Supply operations and benefit the Government.

With this backdrop of our commodity standards program, I would like next to discuss each of our operations, starting with specifications.

Public Law 152

Prior to the enactment of Public Law 152 by the 81st Congress, Federal Specifications work had resulted in approximately 2,000 specifications in 28 years. This represented one of the most successful Federal interdepartmental activities on a voluntary part-time basis. However, a backlog of projects had accumulated which was far beyond the ability of the staff to process in any reasonable period of time. This backlog developed in spite of the fact that there were many departmental and nationally recognized industrial specifications and standards which could have been used in the Federal specifications program. Such specifications, while not having the coverage of regular Federal specifications, are being used satisfactorily for procurement purposes by both industry and Federal agencies.

Congress, recognizing the need for an expanded specifications program, incorporated in P.L. 152 the necessary authority for an expanded Federal specifications and standardization program. As a result of P.L. 152 there followed appropriations for F.Y. 1951 to substantially increase the specifications staff from 37 to 75. It also provided the basis for obtaining appropriations to develop a tire testing program to secure greater tread wear and life.

Public Law 754 of the 81st Congress amended P.L. 152 to permit the General Services Administration to finance the development of Qualified Products Lists. It also permits payment for the printing of specifications with the General Supply Fund, a revolving fund, on a reimbursable basis. Public Law 843 of the 81st Congress provided funds to finance both of the above operations as well as take over the inventory of Federal specifications from the Navy Supply Fund.

P.L. 152 provides that the Administrator of General Services is authorized, with due regard to the requirements of the Department of Defense as determined by the Secretary of Defense, to prescribe standard purchase specifications and requires Federal agencies to utilize such standard purchase specifications.

The President, by memorandum of July 1, 1949, to the Secretary of Defense, the Administrator of General Services, and the Director of the Bureau of the Budget, directed that studies be undertaken to develop areas of understanding with respect to the extent to which the Department of Defense should be excepted from action of the Administrator under Public Law 152.

Presidential Memorandum

As a result of the President's memorandum, negotiations relating to Areas of Understanding between the Department of Defense and the GSA on purchase and packaging specifications and standards are under way. This understanding provides for closer cooperation between the GSA and the Munitions Board in the development of specifications and standards. The Munitions Board will be represented on the Federal Specifications Board. A method of developing Federal specifications both mandatory and optional is provided. Specifications will be produced in a much shorter period of time. Military Qualified Products Lists will be made available to the GSA for distribution to any civil agency. GSA Qualified Products Lists will in turn be made available to the Military Departments.

The proposed Areas of Understanding for Packaging and Specifications also provide for an inter-departmental

packaging group to develop uniform policies for packaging and packaging requirements in specifications. The establishment of such a group is under consideration pending the approval of the agreement between GSA and the Department of Defense.

You can see that these agreements will bring about widespread changes in our operations, both internally and Government-wide.

New Method

The new method of developing specifications contemplates a decrease in technical committee activity and a substantial increase in assignment of responsibility for preparation to the Federal agency best qualified to produce a particular specification. The technicians of the GSA will have increased responsibility both from the viewpoint of administering the program as a whole and from the viewpoint of developing those specifications for which the GSA has a major responsibility. With the Munitions Board represented on the Federal Specifications Board and with closer cooperation, we hope to reduce and finally eliminate the need for converting Military Specifications to Federals when they can be used also by civilian agencies. In time, a specification will automatically fall into the proper groove, either a Federal or Military, and be so maintained.

Change To Be Made

There will be a change in the procedures for distributing specifications. Currently, Federal specifications are published by funds of the Navy Department and agencies reimburse the Navy for specifications purchased. Under the proposed arrangement both Federal and military specifications will be available not only at the Government Printing Office in Washington, D. C., but at each of the GSA Regional Offices which have been designated as sales agents for the Superintendent of Documents. Industrial concerns, requiring a specification in a hurry, may obtain one across the counter at the GSA Regional Offices at the regular price. The Qualified Products Lists previously mentioned will not only aid purchasing agents to make an award rapidly but will notify business when products have been tested, whether or not they qualify under the specification. We will soon initiate the development of Qualified Products Lists in the most important commodity groups. This will provide civilian agencies with a purchase tool they currently do not have.

We look forward to much progress as a result of the agreements with the Military. We expect a marked increase in the production of Federal specifications and an extensive use of optional Federal specifications based on departmental and industry standards and specifications. Such specifications will ultimately either be cancelled or made mandatory.

A policy which can be concurred in by both the Military and the GSA in the field of packaging will not only eliminate differences between those agencies but will aid industry by providing uniform packaging requirements Government-wide.

Cataloging Program

As for our cataloging program, Public Law 152 also placed the responsibility for the development and maintenance of a uniform Federal Supply Catalog System in the Administrator of General Services. All Federal agencies are required to use such cataloging system except under special conditions when the Administrator is authorized to grant exceptions. House Concurrent Resolution 97, adopted April 19, 1950, gives further expression to the will of Congress as to cataloging and does not supersede any of the provisions of Public Law 152.

As mentioned before, areas of understanding between the military and GSA on all phases of supply activity were required in compliance with the President's request. Agreement as to such areas of understanding on cataloging was reached in June 1950 by representatives of the Federal Supply Service, GSA, and the Munitions Board Cataloging Agency, Department of Defense. Predicated on these agreements, the Administrator of General Services, on July 19, 1950, delegated to the Secretary of Defense (with power to redelegate to the Chairman of the Munitions Board) "the authority to develop, in accordance with the objectives and provisions of Public Law 152, 81st Congress and House Concurrent Resolution 97, . . . a uniform Federal supply catalog system appropriate to identify and classify personal property under the control of Federal agencies and suitable for interdepartmental supply activities and Government industry supply relationships."

Munitions Board Direction

Under the Areas of Agreement, the Director of the Munitions Board Cataloging Agency (MBCA), with the advice and assistance of representatives of the three military departments and the Federal Supply Service, directs the development of the Federal Catalog System. The military department representatives reflect the interests of their respective bureaus, services, and commands, and the Federal Supply Service represents all civil agencies having an active interest in supply cataloging.

Appropriation Secured

The Federal Supply Service has been guided in its representation of the civil agencies' interests in cataloging by the Civil Establishments Advisory Catalog Board, established in October 1948, and composed of representatives of interested civilian agencies.

We are working jointly with the Munitions Board Cataloging Agency which is doing the bulk of the catalog work. The actual identification of items is done by the cataloging offices of the military departments and this work is coordinated and unified by the Agency. The Federal Supply Service coordinates civilian cataloging and will provide a small staff of technicians to work under the direction of the Agency in developing required policies and procedures.

The Federal Supply Service has secured the appropriation of limited funds for civilian cataloging and is rapidly recruiting a staff of some 110 people. A great deal of preparatory work has been done and the actual identification of items of importance to civilian supply is about to begin.

It was originally considered that

the catalog operations of the Federal Supply Service would largely be those of coordinating the preparation of catalog data in the respective civil agencies. As the result of an extended survey of civilian catalog needs, completed in August 1950, decision has been made that the Federal Supply Service will perform cataloging for all the civil agencies affected based on detailed information secured from such agencies. The agencies chiefly concerned in supply cataloging were found, as the result of that survey, to include 50 bureaus or comparable subdivisions of 20 principal agencies.

Incident to the present emergency, the military have established an accelerated cataloging program. Under this accelerated program an effort is being made to catalog first those items of supply which are of the greatest importance to national defense. The target date for completion of this accelerated program has been established as October 1, 1951.

GSA is attempting to secure the appropriation of supplemental funds which will permit the civil agencies' portion of the program to proceed concurrently as far as practicable with the military cataloging work. Under this accelerated program all of the items cataloged will be within the commodity areas deemed most important in support of the defense effort.

Special Committee

While the outlook for the Federal Catalog System is far brighter than it has been for several years, I do not mean to imply that we have solved all of our problems. Among the more important matters still pending is that of the development of the Federal Commodity Classification and its convertibility to the existing Standard Commodity Classification at the highest practicable level. This wrok is being done by a special committee and substantial progress is being made.

Other problems which have not been finally worked out but on which progress is being made have to do with single item identification, the utilization of, and the date and method of conversion to the new catalog system. With our closer working arrangement with the military, we are optimistic about solving these problems.

The third operation of our Standards Division is the inspection and testing of commodities. Under Public Law 152, and in collaboration with the Bureau of the Budget and the Department of Defense, the GSA developed a questionnaire to collect information on Inspection Services and Materials Testing Facilities available in the Federal Government. This information will disclose whether existing inspection facilities will permit reduction of the travel time of inspectors, will eliminate criss-crossing of travel paths, and thus permit the agencies to handle the increased workload resulting from our preparedness program. The information collected on the questionnaires will be published as a directory of inspection services and testing laboratory facilities in the Federal Government.

Basic Inspection Policies

A GSA regulation has been developed in collaboration with the Department of Defense for the purpose of establishing basic inspection policies including the extent and place of inspection, the utilization and coordination of existing inspection and testing facilities, and reimbursement for services rendered. Comments on this regulation received from the agencies have been reconciled, and it will be issued shortly by the GSA.

The GSA and the Department of Defense are developing an agreement relative to inspection and testing of supplies. The agreement covers the activities to be performed by the Department of Defense; the GSA; or to be performed jointly. The latter cover:

(1) the utilization and coordination of existing Government inspection and testing facilities;
(2) development of a standard formula and policy for service charges;
(3) development of uniform procedures, documents, forms, stamps, and tags for inspection of supplies;
(4) development of a uniform inspection training program;
(5) arrangements with recognized industry groups so that inspection methods and procedures are consistent with the best practices of industry;
(6) the establishment of uniform inspection techniques, tools, special devices, and aids;
(7) the establishment of quality control standards and procedures; and
(8) the necessary investigations required to determine possible areas of duplication and the recommendation of corrective measures for their elimination.

The agreements reached with the military will affect both the GSA and our interdepartmental inspection operations.

The supplies purchased by GSA will be more thoroughly inspected and tested. The increased GSA purchase program will make more economical inspection possible and will provide means for inspection in suppliers' plants, thus aiding the supplier in his dealings with the Government. GSA inspection is performed in the GSA Regions and Districts. Materials entering Federal Supply Service warehouses are inspected for quality and if tests are necessary they are made in Federal Supply Service laboratories, other Government agency laboratories, or commercial laboratories, depending upon the available facilities. We have been making progress in enlarging our field inspection force.

Specification Requirements

The establishment of Government-wide uniform inspection policies and procedures will make it easier for the supplier to understand Government specification requirements. In addition, the assignment of inspection work to agencies best equipped and qualified to perform a particular inspection job will result in increased efficiency, economy to the Government, and provide better utilization of existing facilities.

There is a Federal group which correlates Government standards policy. Seventeen Federal agencies and the Federal Interdepartmental Safety Council have designated high-level officials to represent them on an Interdepartmental Standards Council, which provides machinery for the development of policy on national and international standardization matters of significance to the United States Government. The secretariat and the

(*Continued on page* 58)

Making Home Ranges and Water Heaters Safe and Efficient

HOW quickly do the surface cooking units of an electric range heat to cooking temperature? How strong is the oven door? How hot will the walls near the range become while the range is in use?

Performance specifications and methods of test to give this type of information for household electric ranges have now been agreed upon on a national basis by all groups concerned in the recently published American Standard Specifications and Test Procedures for Household Electric Ranges. A similar American Standard was issued early this year for electric water heaters.

Prepared by representatives of public electric service companies, manufacturers, home economists, safety organizations, commercial laboratories, and government departments, these American Standards offer a criterion by which the user or the retailer can judge whether the stove or water heater he buys will function properly and will do the job he wants it to do and do it safely. The viewpoint of all these groups was considered by the committee that developed the standards, which worked under the procedure of the American Standards Association, and was sponsored by the National Electrical Manufacturers Association.

Agreement Reached

Although these are the first American Standards in this field—agreed upon by all groups—they are not by any means the first standards for this household equipment. The new American Standards grew out of standards developed by the manufacturers, public utilities, and the safety standards of the Underwriters' Laboratories. Some 30 or more years ago when large electrical equipment for household use was first put on the market, electric service wiring ordinarily had capacity to serve only 2 or 3 kw. This was too light for the heavy load required by an electric range. Public utilities and power suppliers, responsible for installing the additional wiring needed, in many cases were also important distribution outlets for sale of ranges and other electrical household equipment. In order to assure satisfaction to their customers and encourage the use of electric equipment, many of them required certain tests to assure that there was no fire hazard, that the range was properly designed and built to protect users from shock, and that it met minimum standards of performance. Manufacturers set up their own standard testing procedures to verify compliance with these requirements as well as their own performance requirements—first as standards of individual companies, and then as industry standards developed through the National Electrical Manufacturers Association. In addition, some of the utilities and power suppliers often required a check by an independent laboratory before approving installation of a range or water heater on their electric lines. Underwriters' Laboratories' standards were used in testing for safety and NEMA standards for electrical performance and efficiency.

Electrical Testing Laboratories, Inc.

The final test of a good oven—how well it bakes. Oven tests are included in the American Standard for Electric Ranges.

5 Million Increase in Twenty Years

Just before the war the use of electric ranges had increased from about 1,000,000 in 1931 to 3,400,000 in 1942. By November 1950, electric ranges were used in 6,706,000 of the nation's homes—18.0 percent of all homes wired for electric lights.

Originally promoted and sold largely by electricity supply companies, the distribution of electric ranges became more and more a function of electrical dealers and other stores. It is becoming common practice when new houses are built or old ones remodeled to provide a separate range circuit, terminating in an ample 50-ampere, 3-wire outlet receptacle in the kitchen for the purpose of directly plugging in the electric range.

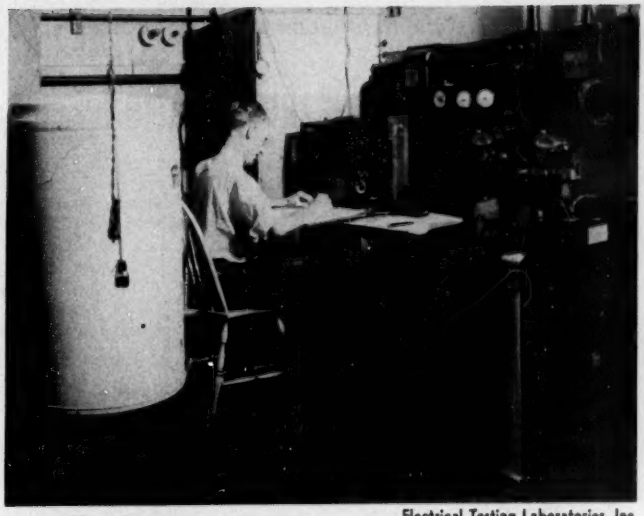
In 1940, to bring the user's viewpoint into the development of the standards, a sectional committee was organized under the procedure of the American Standards Association, with the National Electrical Manufacturers Association as sponsor. Consumer groups and government representatives were included on this committee. Dr Earl C McCracken, at that time physicist for the Department of Home Economics at Columbia University, now with the Bureau of Human Nutrition and Home Economics, U.S. Department of Agriculture, became chairman of the committee. At its first meeting in 1941, the committee used as a starting point the EEI-NEMA standards for test procedures and electrical efficiency and the Underwriters' Laboratories' standards for safety. It then proceeded to build an American Standard for household electric ranges.

War Interferes

The war stopped the committee's work. As soon as the electric range industry was permitted to reconvert from war work and resume the manufacture of electric ranges, work on the standards was taken up again.

The result is an American Standard which outlines general requirements and provides methods of test and definitions acceptable to all groups concerned — manufacturers, power suppliers, government, consumers, safety and insurance interests. Tests made on this uniform basis can be compared and results evaluated.

All agree that this American Standard is of unusual importance as providing the first uniform nationally agreed upon requirements in the field, although some of the consumer and retailer groups would like to see the standard include more detailed performance requirements. A subcommittee working on recipes and cooking tests to check the baking efficiency of the oven, for example, was delayed in its work and the standard was approved without these tests. In a speech before the recent annual meeting of the American Home Economics Association, Dr McCracken announced that cooking tests have now been completed by the subcommittee.



Electrical Testing Laboratories, Inc.

Performance tests on storage-type electric water heaters make sure the householder will have hot water on tap when he needs it.

The American Standard includes performance requirements for many characteristics important to the person who uses an electric range. Servicing facilities must be readily accessible. Height of the cooking top is to be 36 in., the height generally used for all other kitchen working levels. Temperatures of surfaces to be touched must not exceed 130 F, or in case of nonmetallic surfaces, 150 F. Tests are provided to make sure that parts of the range not carrying electric current will not become energized during use and cause shock or burns. Wires are to be protected and insulated so they cannot be damaged and cause shock or fire. The minimum heating efficiency of the surface units and other cooking units is specified. Accuracy of thermostats, life of switches, sturdiness of oven doors, and resistance of enamel to acid are all included in the tests and specification requirements.

Detailed Tests

The tests outlined in detail include life of heating units, rate of preheating, oven baking, oven life, thermostat life, sturdiness of doors, stiffness of doors, vapor tightness of oven lining, and rigidity of the complete range.

Water Heater Standard

The recently approved American Standard for Household Automatic Electric Storage Type Water Heaters provides users, public utilities, insurance underwriters, and safety groups with a criterion for determining whether water heaters built and tested in accordance with the standard meet minimum requirements for safety and efficiency.

A test for delivery performance, for example, offers a basis for determining accurate tables of sizes of heaters and the electric load they require to provide hot water at the temperature and in the amount needed by the user. Temperature control tests for thermostats give information on the needed adjustment range—the lowest cut-off temperature not less than 120 F and the highest not higher than 170 F. Thermostats are to be marked with their rating in volts and amperes and with a graduated scale indicating the cut-off temperature obtainable within the range of adjustment.

The rated voltage is specified, as well as operating voltage range and standard rated watts input of heating units for different size tanks. The tank is to withstand a hydrostatic test pressure of 300 pounds per square inch without distortion or leaks.

(*Continued on page 60*)

A Large Utility

(*Continued from page 42*)

turer's representatives disclosed that the instruments were being used in subzero temperatures and that they probably were given insufficient time to stabilize their characteristics. It is believed that information regarding operation of instruments at subnormal or abnormal temperatures is insufficiently disseminated. Operation of instruments at other than normal temperatures introduces an error or variable for which a correction must be made. This point is well covered by the item "External Temperature Influence" which is listed in the tabulation of detailed requirements of the 1951 edition. While this item is included in the older edition, its meaning is rather obscure and for routine usage it is susceptible to be overlooked or ignored.

It is improbable that any one concern, other than an instrument manufacturer, will make use of all of the requirements for each type and class of instrument and few laboratories are set up to conduct all the tests outlined in the 1951 edition. However, in the event that any tests are "farmed out" to another agency, the use of the 1951 American Standard for Indicating Instruments as a test specification offers the greatest certainty of a complete understanding as to what is expected and how the test is to be conducted. In our case we have little or no interest in a few of the requirements listed on the detailed requirement sheets, for example, the material and finish of the case. We are, however, very much interested in other requirements, such as Rated Accuracy, Response Time, Loss, Dielectric Test, and Sustained Operation influence.

New Edition Helpful

This new edition will be particularly helpful to many users who may not know exactly what to expect from a given type of instrument, and the tabulated classification will be of considerable assistance in selecting an instrument with suitable characteristics for a specific use. Here are two examples of questions concerning instruments that are answered by the 1951 edition.

Can an instrument whose normal operating position is vertical or horizontal be operated at 45 degrees and retain its accuracy rating?—The standard advises the angular displacement (much less than 45 degrees), through which the instrument may be tilted and still operate at its rated accuracy. However, if requested, the manufacturer will calibrate the instrument for any specified angular position.

The starting current of a stoker or compressor motor may be as much as 10 times its normal operating current. Can a switchboard a-c ammeter be connected permanently in a circuit to such a motor without fear of damaging the instrument?—In this particular case the answer according to the standard is "yes."

Common Ground Attained

With this standard we, as well as other users, now have a common ground together with the manufacturer as to what may be expected of each instrument, whether we are concerned with ordering, testing, or determining when repair by the manufacturer is necessary. Expressing this statement in other terms, test data may be taken on a given instrument by different technicians, and all of these data may be co-related into a single picture since the basis for each test is the American Standard for Electrical Indicating Instruments. Similarly, data observed by different organizations on a given type of instruments also may be co-related.

This Standard should be of incalculable value to all members of the electrical industry. It represents a generous contribution of time and effort by men with large experience and access to the most up-to-date information on the subject of instrumentation.

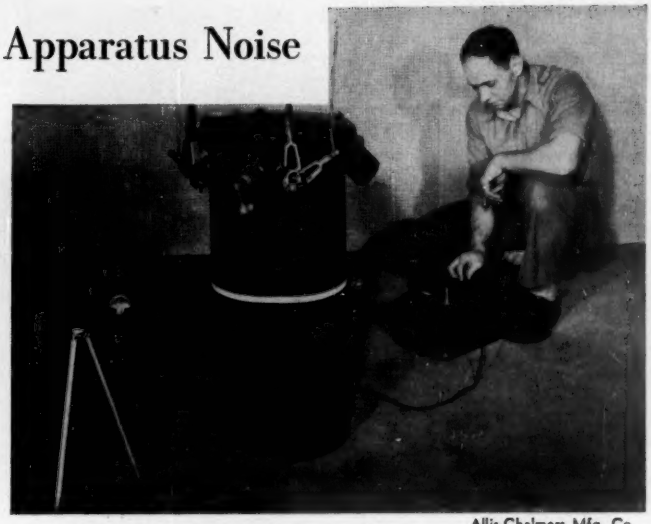
Some comments by our test engineers follow:

"The 1951 standard, with definitions, general requirements and detailed requirement sheets, presents all needed information factually, clearly and concisely."

"It is a good job well done and includes data that formerly was not conveniently available to the user."

How to Measure Apparatus Noise

by C. H. G. Gray



Allis-Chalmers Mfg. Co.

A noise meter is here used to determine whether a transformer will be excessively noisy after it is put to work in the power plant.

AN important step in resolving some of the difficulties in apparatus noise measurement was the standardization in 1944 of the Sound Level Meters for Measurement of Noise and Other Sounds, Z24.3. Recently another advance has been made in this direction with the standardization of a Test Code for Apparatus Noise Measurement, Z24.7, which recommends procedures to be followed in using the sound level meter.

The accurate measurement and evaluation of apparatus noise involves many perplexing and often controversial problems. The distribution of sound about noise sources, other than a few simple types, is usually very complex. Surfaces of noise-producing bodies vibrating with multiple degrees of freedom give rise to sound patterns which defy mathematical analysis. If the noise source is in a room, sound from the source will usually be reflected back and forth many times from the exposed surfaces in the room and so give rise to a complicated distribution of sound level within the space. At any point within the room, the sound level will be the result of two effects, namely, the direct sound which reaches the point wihout first being reflected, and the indirect sound which arrives after undergoing one or more reflections from surrounding surfaces. At the resonant frequencies of the room these reflections may build up to very large values.

In the measurement of apparatus noise, only the direct airborne noise should be measured. The influence of reflected sound or of ambient noise at the test location should be made negligible. In general, this requires an enclosure suitably treated with sound-absorbing material on the several surfaces and suitably insulated against external sounds and vibrations. The method of mounting the apparatus for test is important. Care must be exercised in selecting the points about the apparatus at which sound level measurements are to be made. Their number and location will be a function of the type and size of the apparatus producing the noise. The locations selected should be such that any microphone used as a sound pickup will be unaffected by disturbing air currents, vibration, electric or magnetic fields, or other external influences. The microphone should not be placed at a nodal point of a standing wave.

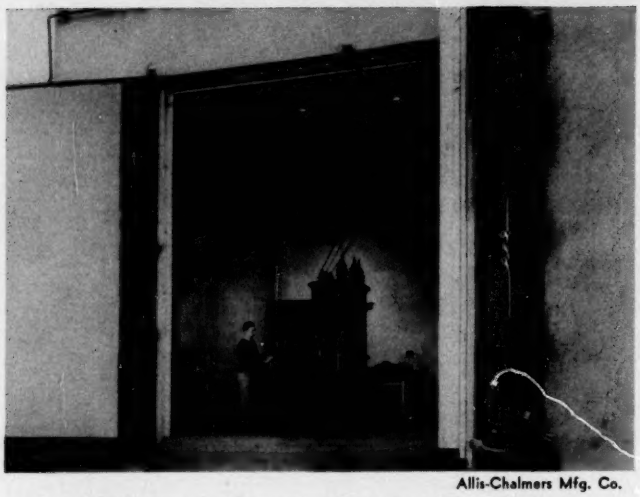
"Sound Levels"

In measuring noise with a meter, one which complies with the American Standard Sound Level Meters for Measurement of Noise and Other Sounds, Z24.3-1944 should be used. The sound level meter provides purely objective measures of weighted sound pressure levels, and the results are expressed as "sound levels" on a decibel scale, the zero of which corresponds to a sound pressure of 0.0002 dyne per square centimeter at 1000 cycles per second.

Apparatus noise may also be measured by subjective methods such as judgment tests of loudness. The results of such tests are expressed as the loudness level of a sound in phons when the loudness level is equal in magnitude to the sound pressure level of the 1000-cycle tone which is judged by an adequate sound jury to be as loud as the sound.

Mr Gray is Transmission Standards Engineer, Bell Telephone Laboratories. As chairman of the subcommittee that did the preliminary technical work and wrote the original drafts, he had the principal responsibility for development of the new American Standard Test Code for Apparatus Noise Measurement. The Code was developed through Sectional Committee Z24, sponsored by the Acoustical Society of America under the procedures of the American Standards Association. Among the industries represented were air conditioning; refrigeration; heating and ventilating; electric light and power; radio; and fan manufacturing.

Copies of the American Standard Test Code for Apparatus Noise Measurement, Z24.7-1950, can be obtained from the American Standards Association at 50 cents each.



Allis-Chalmers Mfg. Co.

Soundproof room eliminates external noises and vibrations in tests to determine how much noise this transformer makes during operation.

The relation between loudness level as defined above and sound level as measured by a sound level meter is quite complicated. For single frequency tones, or noise in narrow frequency bands, the two types of levels would be numerically equal if the theoretically correct response curve were available in the sound level meter. For complex sounds, the loudness levels in phons as judged by a sound jury will in general be numerically greater than the sound levels in db as measured by the sound level meter, the differences ranging from a few db to as much as 15 db for very complex noises in which components of approximately equal magnitude are rather uniformly spaced over the entire audible frequency range. Moderate changes in the level of a sound, produced by amplification or attenuation, will produce a change in sound level which will approximate a corresponding change in loudness level in phons assuming that proper weightings are used in the meter measurements.

The possible differences, noted above, between sound level meter measurements and judgments of the loudness of two different sounds has been the source of much of the controversy in the field of sound measurements. Another factor of a psychological nature has developed from attempts to use sound level measurements as a means of evaluating the relative annoying effects of different sounds. It should be recognized that the American Standard Sound Level Meter measures only weighted sound pressure level. It does not measure loudness or annoyance. No meter has been produced that will satisfactorily measure either of these. If these are the principal factors of interest in evaluation of noise, recourse must be taken to listening tests.

There are many instances in the noise measurement field where a knowledge of the sound pressure level alone is sufficient. This is particularly true where the noises being measured are of the same general character, such as the usual room or street noise. It is also true in the case of many noise reduction problems. Another example is inspection in factories of the noise performance of apparatus which is in commercial production. Comparisons of the noise performance of apparatus of one design with that of another design may be possible but, in general, additional tests involving frequency analyses[1] and listening tests are advisable. Another application where the sound level meter measurements should be supplemented with other varieties of noise measurement is in connection with the appraisal of the noise performance of either new apparatus or apparatus in new surroundings where in neither case is there previous knowledge regarding such factors as the frequency composition of the noise, its waveform, or the effects of the surroundings in conjunction with the noise source.

In formulating the American Standard Sound Level Meters for Measurement of Noise and Other Sounds, Z24.3-1944, the approach was aimed at bringing about uniformity in the objective measurement of noise. It was hoped that this would advance the art and serve as a benchmark until further fundamental studies and experience made possible the development of an improved sound level meter. It is believed that the practical advantages gained by the use of the present meter have far outweighed its shortcomings, some of which may be attributed to improper usage and lack of a guide therefor. The availability now of an American Standard Test Code for Apparatus Noise Measurement, Z24.7-1950, focuses attention on the problems involved in noise measurement. As in the case of the sound level meter, the approach again has been aimed at establishing reasonably uniform methods of conducting and recording sound level tests on apparatus when a standard meter is used.

The new American Standard Test Code for Apparatus Noise Measurement, Z24.7-1950, contains general recommendations to serve as a guide in the development of sound level measuring techniques. It is intended to serve as a common foundation for the preparation of future codes, covering specific types of apparatus, by appropriate committees representing the industries involved. This new Test Code is not intended to take the place of test codes prepared specifically for particular types of apparatus but it may be helpful as a guide in any revision of existing codes. With the Test Code is an appendix outlining general considerations in apparatus noise measurement.

[1] An American Standard Specification for an Octave-Band Filter Set for the Analysis of Noise and Other Sounds is in preparation.

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Westinghouse

PANEL INSTRUMENTS (ASA C39.1*)

All of these sizes, shapes and types of mounting are made available to you in Westinghouse Panel Instruments—the most complete matched line in the industry. For all your panel instrument requirements refer to Westinghouse Catalog Section 43-300—or ask your nearest Westinghouse Representative.

**ASA C39.1 dimensions cover only the flange mounting in the rectangular and round, flush types.*

Government Planning

(*Continued from page* 51)

chairmanship of the Council are provided by the Federal Supply Service.

The Council is not an operating group, but one in which any standardization problem of Government-wide or international interest may be discussed. It crystallizes Government viewpoints on specific standardization projects, and assists the Department of State with advice on standardization matters which concern its international negotiations with foreign governments. In addition, it provides a channel through which proposals of foreign governments on international standardization matters of interest to the United States Government can be reviewed and the Government-wide view established.

The Council offers the medium through which technical societies, associations, and industry groups may contact the Federal Government on standardization problems. About one of our important problems—we have not solved the matter of active participation of our staffs and the staffs of other agencies in the work of technical societies and associations. We are continuing to work on this and hope some arrangements can be made to permit this valuable cooperation.

Color Code

To get back to the Council, one of its actions of interest to the ASA is the submission of the Color Code for Compressed Gas Cylinders and Pipe Lines, MIL-STD-101, as a basis for an American Standard. This standard has already been approved by the Departments of the Army, Navy, and Air Force, and by the Munitions Board. It became effective for use by the armed services on January 1, 1950. As this standard bears a relation to both the American Standard Code for the Identification of Piping Systems, A13-1928, and the American Standard Method of Marking Compressed Gas Cylinders to Identify Content, Z48.1-1942, a general conference of all groups concerned was held at ASA headquarters.

This is an example of the Council's work on Government-wide standardization matters.

Conservative Measures

The development of substitutes for materials on the highly critical list is becoming of primary importance in our preparedness program. The GSA on July 21 was given very definite responsibilities relating to the conservation of critical materials. In order to discharge this responsibility imposed by the President, the Standards Division is presently making an analysis of Federal specifications to determine in which areas it may be advisable to substitute other materials for those on the critical list. A list of such materials has been prepared as a guide for the use in conservation amendments and emergency specifications when the necessity for such action is justified.

Policy Development

A policy is being developed by the GSA, the Munitions Board, National Production Authority, and the National Security Resources Board for processing conservation amendments or emergency specifications. The conservation program will be in accordance with the regulations and material orders issued by the National Production Authority. Conferences have been held with the NSRB on the possibility of processing and circularizing conservation and substitution information on scarce materials.

At the request of the NSRB, through the facilities of the Interdepartmental Standards Council, a survey on Materials Conservation and Utilization Programs has been completed. Valuable information has been collected and made available on this subject, illustrating conservation measures of the Government in existence at this time.

The GSA, having definite responsibilities in the Government-wide conservation program, will keep in step with new developmen's in connection with national defense.

It is our purpose in GSA to utilize existing American Standards to the full in Federal specifications and in the Federal standardization program. It is my further purpose to develop and obtain approval of procedures which will make it possible for agencies of the Government and particularly the GSA, to participate fully in the standards development activities of ASA. I regret that it has not been possible to achieve this goal up to the present, but we will continue to direct our efforts toward this objective.

Laboratory Instruments

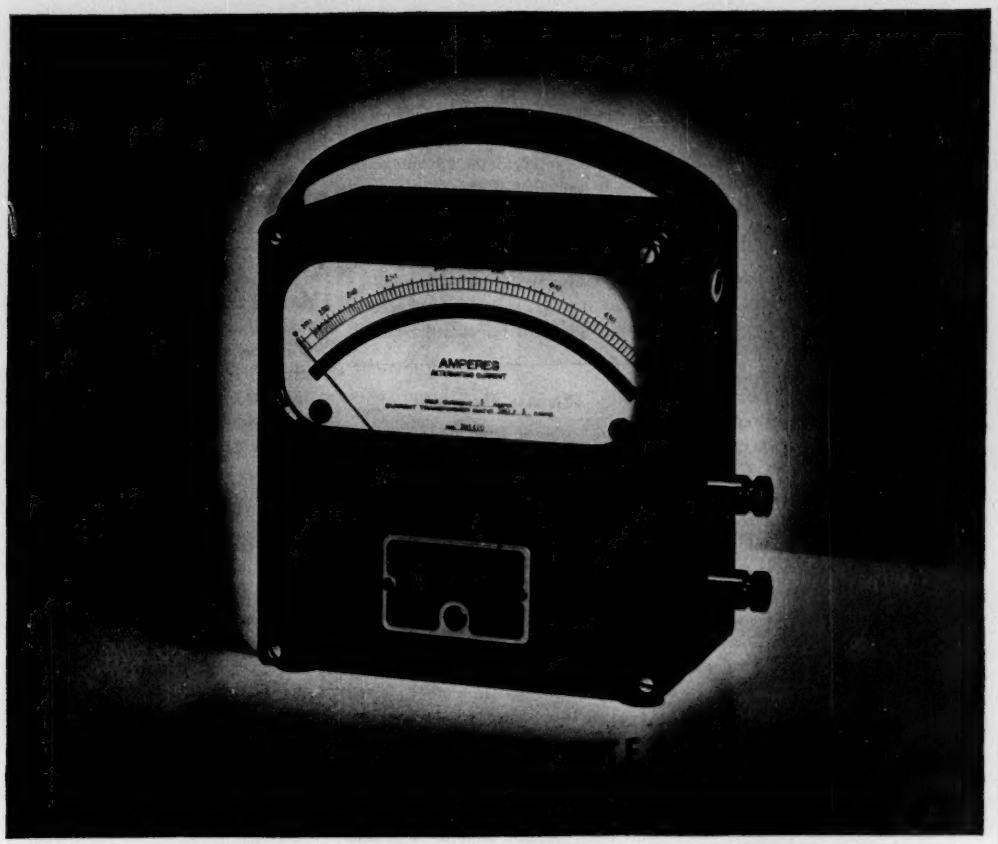
(*Continued from page* 41)

as a supplement, an entirely new document be printed coordinating new types. This was particularly acceptable to the committee since, in the review of the older document, numerous clarifications had been proposed and some extensions of the definitions were needed to cover the portable instruments. Fortunately, the revisions had been put in the record as the work progressed and the chore of putting the new standard together then became largely editorial.

It is believed that the new standard has picked up and eliminated most errors and ambiguities in the original printing on the panel and switchboard instruments. The new work on portable instruments, however, is completely new and some errors will be found. It is hoped that those using the standard and faced with those difficulties will write in about them to the ASA staff since, with the concurrence of Mr Lee, the committee will be maintained and will probably meet together from time to time to consider rulings on questions which may be posed.

As stated previously, a specification is really a living document and can never become static. By the same token it can only be brought to a high degree of ultimate usefulness through the comments received from those working with it.

In closing this brief resume, the writer wishes to express again his appreciation of the work of the committee members. A rather remarkable degree of tolerance and consideration of the viewpoint of others has always been extended, along with a desire to compromise to the end that a standard acceptable to all be made available.



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PANEL INSTRUMENTS

Included in the broad range of electrical instruments that bear the R-S mark are the 3.5" miniature panel instruments shown below. *These are built in commercial types and to A.S.A. Standard C 39.1/1950.* Other R-S instruments include switchboard and portable types to meet practically every industrial, power and laboratory need. Let us quote prices and deliveries on your instrument requirements.

Roller-Smith "Steel-Six" portable testing instruments were designed primarily for general testing where a highly accurate, and moderately priced instrument is required. The rugged all-metal case is both dust- and moisture-proof and also furnishes full magnetic shielding of the movement. Large window openings combined with well-designed dials set exceptionally close to the front of the case afford unusual readability. Instruments are approximately 6" square by 4" in depth. Ratings cover a broad range of testing requirements.

"Steel-Six" testing instruments are supplied with single or multiranges for the measurement of direct current in amperes, milliamperes, volts and millivolts; for alternating current measurements of amperes, milliamperes, volts, watts, power factor and frequency. Catalog 4340 contains complete information. Send for a copy today.

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Measurements

(*Continued from page 46*)

Schenectady. In addition, there are three outlying sections appropriate to the new and growing work. Standardization is still prominent in the activities of the Laboratory, for wherever measurements are, there standardization will be. The two advance, hand in hand. The responsibility for specific instrument standardization is vested with the engineers of the Meter and Instrument Divisions of the Apparatus Department of our Company at West Lynn, Massachusetts, where General Electric Instruments are manufactured in quantity production.

Most of the difficulties met with in standardization in commerce and trade come from our lack of knowledge of measurements. Where measurements are available to provide the facts, there the basis of standardization exits. With the enormous advance of contemporary science and engineering into new fields, measurements have been called upon to render most unusual service. The measurements engineer has responded in a way which is marvelous to behold. In fact, without the products of the measurement engineer, present industry could not continue to function.

With the increasingly exacting requirements of industrial machinery and with the new avenues of application and use, new and more severe requirements frequently demand even better knowledge than existing measurements abilities can provide. Thus there exists continual need for measurement advances. Much of this will have to come from the scientist through research to provide the necessary new knowledge; then there must follow the fashioning of this new knowledge by the engineers into measuring instruments and standards for service. Then can come the meeting together of minds for bringing the needed standards into use that there may be understanding in commerce and trade to eliminate the barriers of uncertainty and of confusion. This has been the formula for advance in the past; it is the formula for advance in the future.

As the engineers in ASA Committee C39 continue their activities, bringing into being the standard they are now working on for Recording Instruments, they typify recognition by the engineer of the advantage of a clear statement of characteristics as embodied in a standard. Especially in their own fields of measurements they exemplify the need of measurements to assure a clear understanding of all that will be brought together in any standard for useful result.

Home Ranges

(*Continued from page 53*)

General standards cover accessibility, color coding at the terminal box, guarding of parts, marking, electrical insulation, sturdiness, tank capacity, location of secondary heating unit, plumbing connections, tank piping, and enclosure of electrical parts.

Electric water heaters offer a different problem from other electric appliances because of the methods under which they are operated as a completely automatic appliance. They are self-contained and therefore can be insulated against loss of heat on all sides, top, and bottom. With such insulation the tankful of water can be thoroughly heated and stay hot for long periods for use whenever it is wanted. This makes it possible to supply energy to a water heater only at times when there is less than the peak demand for electric current and still have excellent hot water service. In order to encourage the charging of water heaters during those hours when electricity is not in great demand, many electric power suppliers offer especially favorable rates for current used during these hours.

For this reason, standards are of particular importance to them, making it possible to install meters and time switches to keep track of the current used and to determine when it is to be used. Careful control of the operation of the heater, standards for wattage and voltage characteristics, and for efficient operation assure good service for both domestic user and power supplier.

Concrete Standards

(*Continued from page 47*)

Steel Bars for Concrete Reinforcement (ASTM A160-39; ASA G43.1-1942). It is expected that these revisions, when finally adopted by ASTM, will be submitted to ASA. This is also expected in the case of ASTM Specification A305.

In addition to consideration of the new edition of the ACI Building Code Requirements for Reinforced Concrete, the American Concrete Institute will consider one new standard and a number of other proposed revisions of ACI standards at its convention.

The new standard to be presented for adoption is the proposed recommended Practice for the Application of Mortar by Pneumatic Pressure, by ACI Committee 805. This proposed standard presents briefly the advantages and disadvantages of pneumatically placed mortar and establishes recommended practices for placing and mixing shotcrete, qualifications and duties of workmen, preparation of surface before shotcreting, sequence of application, and other items involved in good shotcreting.

ACI Committee 617 will present proposed revisions of Specifications for Concrete Pavements and Bases (ACI 617-44). The new specifications incorporated include those covering air entrainment, removal of forms, premolded joint fillers, and joint filling materials and method of placing reinforcement. Definitions have been added under soil foundation preparation and other parts of this section have been revised.

Revisions proposed by ACI Committee 315 to the Institute's Manual of Standard Practice for Detailing Reinforced Concrete Structures (ACI 315-48) will bring the manual into conformity with proposed changes of the ACI Building Code allowing new bond values for new-style deformed reinforcing bars. Changes are proposed in reinforcing bar designations to conform to the numbered designation of the U. S. Department of Commerce in all drawings to agree with new bond values and anchorage details for new-style deformed bars.

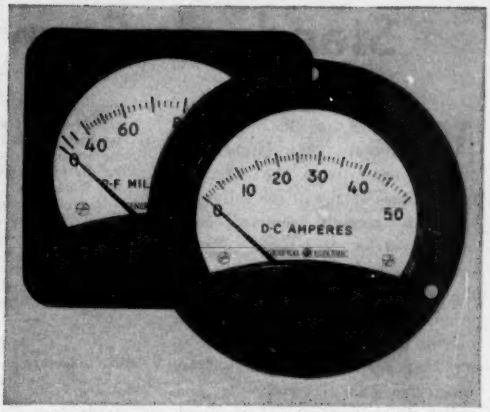
G.E. STANDARDIZES

FOR GREATER PROGRESS IN ELECTRICAL MEASUREMENT

In the design of electric instruments, General Electric recognizes the outstanding benefits possible through standardization. In details of construction, dimensions, ratings and performance characteristics, standardization provides greater convenience, better service, and fewer maintenance problems for the user.

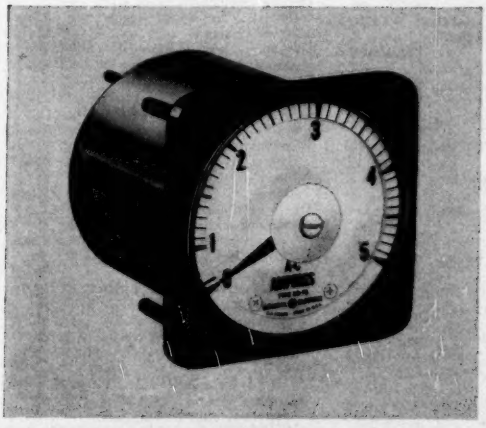
General Electric also recognizes the need for a wide variety of instruments. We try to make our line as complete as possible, providing the application assistance which may be necessary to make sure that the right instrument is used for each job. This service, together with consistently high standards of accuracy, durability, and dependability, have made General Electric instruments widely used and respected.

Apparatus Department, General Electric Company, Schenectady 5, N. Y.



PANEL INSTRUMENTS. A complete line in a variety of sizes and case styles. Particularly useful in radio equipment and industrial applications where accuracy and quality are required and space is at a premium. For d-c, a-c, r-f, and a-f measurements; in 1½-, 2½-, and 3½-inch round and square cases and 4¼-inch rectangular cases. All but a-c types employ unique internal-pivot construction for minimum depth behind panel.

PORTABLE TYPES. Precision measurement for laboratory and field applications. The Types P-3 (above) and DP-2 have an accuracy of 1/5 of 1 per cent, with scale length of 6½ inches. The medium-size, Types AP-9 (below) and DP-9, fall in the ¾ of 1 per cent class, with scale length of 4.1 inches. Both find wide usage in utility and industrial testing, and in school and industrial laboratories.



LONG SCALE SWITCHBOARD INSTRUMENTS. Designed for readability, with shadow-proof glass, antiparallax scale, large clear numerals. In 1 per cent accuracy class, they have 4¼-inch case, with 7.1-inch scale. Available as d-c ammeters and voltmeters; a-c ammeters, voltmeters, and wattmeters; frequency and power-factor meters.

GENERAL ELECTRIC

Standards From Other Countries

MEMBERS of the American Standards Association may borrow from the ASA Library copies of any of the following standards recently received from other countries. Orders may also be sent to the country of origin through the ASA office. The titles of the standards are given here in English, but the documents themselves are in the language of the country from which they were received.

For the convenience of our readers, the standards are listed under their general UDC classifications.

54 Chemistry

FRANCE	NF
Colorimetric Measurements of pH Test for Silicon Contents	T 90-006 T 90-007
INDIA	**IS**
Specification for Acetone	170-1950
Specification for Antimony	211
RUMANIA	**STAS**
Ether, Ethylic	1049

614.8 Prevention of Accidents. Safety Measures

CANADA	CSA
Fire Hazard Specification for the Construction and Test of Domestic Oil Burning Equipment Vaporizing Sleeve Type	Z 93.1-1950
Fire Hazard Specification for the Construction and Test of Domestic Oil Burning Equipment Vaporizing Pot Type	Z 93.2-1950
CHILE	**INDITECNOR**
Protection of Foundry Workers	2.68-2
DENMARK	**DS**
Firehose Couplings	no number
FRANCE	**NF**
Semi-rigid and Flexible Fire Hoses	S 61-111
RUMANIA	**STAS**
Fire Fighting Apparatus. Portable Fire Hydrant	697

621.3 Electrical Engineering

ARGENTINA	IRAM
AC Electric Fuses up to 250v to Ground	2014
Plug-in Heating Tester of Household Appliances	2029
Hot-Cathode Fluorescent Lamps	2036
Tungsten Filament Electric Lamps for Railways and Tramways	2055
Artificial Rain for Dielectric Testing	2066
Series Multipliers and Shunts for Electrical Indicating Instruments	2081
Plug-Receptacle Connectors for Workshops	2087
Grade A Humidity Chamber for Testing Electrical Materials and Appliances	2089
Fixed Composition Resistors	4010
Telecommunication Vocabulary-Electronic Tubes	4015
Method for Testing Radio Receivers	4017
AUSTRALIA	**AS**
PVC-insulated and/or Sheathed Cables, Flexible Cables, and Flexible Cords Cords	C.147-1950
Hearing Aid Batteries (Leclanche Type)	C.303-1949
Wooden Separators for Lead-acid Accumulators	C.305-1949
AUSTRIA	**ÖNORM**
Bare Wires of Copper, Bronze, Aluminum and Aldrey Metal	E 4000
Bare Cables of Copper, Bronze, Aluminum and Aldrey Metal	E 4001
Galvanized Steel Wire for Overhead Lines	E 4006
Galvanized Steel Cable for Overhead Lines	E 4007
Electrical Switching Diagrams	E 4920
CANADA	**CSA**
Electrical Code: Construction and Test of Enclosures for Use in Class 2, Groups F and G Hazardous Locations	C22.2-No 25-1950
Electrical Code: Construction and Test for Grounding and Bonding Equipment	C22.2-No. 41-1950
Pole Line Hardware, Communication Lines	C83.1-1950
Pole Line Hardware, Power Line	C83.2-1950
CHILE	**INDITECNOR**
Copper of High Electrical Conductivity	2.55-1
Hot-rolled Copper Rods for Electrical Use	2.55-2
Soft or Annealed Copper Round Wires	2.55-3
Hard Copper Round Wires	2.55-4
Semi-hard Copper Round Wires	2.55-5
Soft or Annealed Copper Tinned Round Wires	2.55-6
Copper Contact Wires	2.55-7
Concentric Copper Cables	2.55-9
Non-concentric Copper Cables	2.55-10
Cables Composed of Concentric Copper Cables	2.55-11
Cables Composed of Non-Concentric Copper Cables	2.55-12
Copper for Electric Conductors	2.55-24
Fundamental Electrical Units	2.4-16
DENMARK	**DS**
Egg-shaped Insulator	No number
Wire Clamps	No number
Transformer Stations	No number
FRANCE	**NF**
Thirty-six standard specifications for domestic electric heating appliances such as stoves, plates, toasters, boilers, fans, hair driers, etc.	C 60-1 through C 60-36
GERMANY	**DIN**
Oil-level Indicators Type A and B for Transformers	42552,B1.1.2
Sheet-metal Cores for Telecommunication Transformers	41302
Terminal Block with Cover for Telephone Lines	41492
Tension Hook for Brush-Holder Springs	43054
Indicating Instrument Housings, Dimensions	43700
Connecting Bolts up to 1000 amp	46200
Rules for Construction of Power Lines for Hoisting Machines	57240
Heat Resisting Plastic Sheets	57345
Rules for Sphere-Gap Voltage Measurement	57430
Rules for Sphere-Gap Voltage Measurement, in X-Ray Installations	57431
Rules for Fixed Capacitors in Power Lines	57560
Self-cooling Dry Transformers, 10-800 kva	42524,B1.1
Connecting Bolts up to 2000 amp	46206
Lightning Rods	48802
Fixed Composition Resistors 0, 25 W - 1 W	41401/2/3
Fixed Wire Resistors 0, 5 W - 2 W	41411/2/3
Automobile Light Switch	72757,B1.3
Foot-Brake Light Switch	72759,B1.2
Telecommunication. Fixed Resistors, Composition Type, Rating 2-20 W	41404—414048
Telecommunication. Fixed Resistors, Wire Type, up to 50 W. General	41410
Telecommunication. Fixed Resistors, 4 W and 6 W	41415/6
Telecommunication. Fixed Resistors, 12 W	41418
Telecommunication. Fixed Resistors, 25 W	41420
Telecommunication. Fixed Resistors, 50 W	41423
Name Plates for Electric Machines	42961
Disconnecting Switch for inside installation, 3-pole, 1-30 kva, up to 600 amp	43608
Lighting Arresters. Wire and Material Specification	48801
Lighting Arresters, Terminals	48809
Fuse holder, Type D-R1¼", 100 amp 500v	49312
Snap Gages and Limit Gages for D-Type Fuses	49361,B1.3
INDIA	**IS**
Specification for Leclanché Type Dry Cell and Battery for Flash Lamps	203-1950
POLAND	**PN**
Plug and Receptacle for Electric Connection Between Cars	S-76056/59
Cables for Railroad Cutouts	E-47
Tap-changing Switch for 3-phase Transformer	E-81400
DC-Traction Motors	E-37
Round and Figure-8 Overhead Wire for Tramways	E-105

Rubber-Insulated and Fabric-Covered Aluminum Wires E-106
Plug and Receptacle Connectors between Cars S-76055,-7,-8

RUMANIA **STAS**

Lead Batteries, for Cars and Stationary 444/5
Cartridge Fuses, 200 amp, 500 v 452
Electric Apparatus Protecting Against Voltage or Current Surge 553
Edison Screw Type Lamp Bases 555
Conductor Tension Clamp for Overhead Lines 680
Edison Screw Lamp Sockets 690
Edison Screw. Dimensions 691
Swan-Neck Fixture for Street Lights 806
Insulators for Overhead Telecommunication Lines 810
Electric Traction. Reduction of Stray Currents 833
Units of Electricity and Magnetism 862
Power Distribution Network. Standard Voltages 930
Flexible Rubber-Insulated Cables 958/9/60
Electric Cables for Electric Welding 1020
Illuminating Cable, Armored and Fabric Covered 1022/3
Method of Tying Overhead Line to Insulating Supports 1117
Different Connecting Lugs 1231/2/3/4
Paper- and Rubber-Insulated Cables 1235/6/7

SPAIN **UNE**

Voltages Used in Welding Work 20008

SWITZERLAND **VSM**

Copper or Aluminum Cables for Bare and Insulated Electric Conductors, Rigid Type 23865 b
Copper or Aluminum Cables for Bare and Insulated Electric Conductors, Semirigid Type 23866 b
Copper and Aluminum Cables for Bare and Insulated Electric Conductors, Flexible Type 23867 c
Copper Bare and Insulated Cables, Extra Flexible 23868 c

UNION OF SOUTH AFRICA **SABS**

Specifications for Paper-Insulated Electric Cables for General Purposes 97-1950
Specifications for Paper-Insulated Electric Cables for Heavy Duty 98-1950
Electrical Equipment Safety Specifications for Domestic Electric Washing Machines SV 108-1950
Plug, Socket and Socket Outlet Adaptors, Safety Specification for SV 109-1950
Electric Hand Lamps, Safety Specification for SV 112-1950
Electric Soldering Irons, Safety Specification for SV 115-1950
Portable Electric Reading Lamp, Safety Specification for SV 123-1950

621.6 Apparatus for Conveyance and Storage of Gases and Liquids. Conduits and Pumps

DENMARK **DN**

Pipelines for Dairies, etc. Seamless Pipes; Pipe Couplings; Details of Couplings 720; 721.0; 721.1/2/3

FRANCE **NF**

Flanges and Joint Ring Gaskets E 29-021/2
Drainage Valves and Their Handwheels E 29-381/2/3
Suction Hose with Foot Valve E 29-391
Gate Valves, Different Types, Bronze, Cast Iron, Cast Steel, for Various Nominal Pressures up to No. 64 E 29-401—E 29-413
Globe and Check Valves, Bronze, Cast Iron, Cast Steel, Flanged and Screwed Types, for Various Nominal Pressure, up to No. 100 E 29-431—E 29-444
Cocks, Two- and three-way Bronze, Cast Iron, Cast Steel, Flanged and Screwed Types, for Various Nominal Pressures up to No. 16 E 29-471—E 29-483
Drums and Casks for Petroleum Products, Light and Heavy Types, Capacities from 50 to 165 liters M 88-601—M 88-604
Slip-on Rings to be used with Various Types Welded Pipe Flanges, Nominal Pressures from PN No. 2, 5 to PN No. 40 E 29-292—E 29-298
Slip-on Rings to be used with Various Types Welded Pipe Flanges, Tool Contours and Sizes. Rake Angle E 66-305
Various forms of Roughing, Finishing, Parting, Grooving, Thread-Cutting (External and Internal), Planer Tools, etc, etc E 66-311—E 66-324
Threaded Plugs E 27-431
Pipes, Nominal Diameters of E 29-001
Pipes, Dimensions of Round Flanges, Pressure up to PN No. 100 E 29-201
Pipes, Dimensions of Oval Flanges, Pressure up to PN No. 25 E 29-202
Pipe Flanges, Round, Cast Steel for Nominal Pressures PN No. 16, 25, 40, 64 and 100 E 29-211—215
Round Welding Flanges, Nominal Pressures PN Nos. 2, 5 and 6 E 29-221
Round Rolled-in Flanges, Nominal Pressures PN Nos. 2, 5, 6, 10, 16, 25 E 29-231—234
Round Screwed Flanges, Nominal Pressures PN Nos. 2, 5, 6, 10, 16 E 29-261—263
Oval Welding Flanges, Nominal Pressure PN Nos. 2, 5, 6 E 29-271
Round Flat Welding Flanges, Nominal Pressure PN. Nos. 2, 5, 6, 10, 16 E 29-281 283
Round Collar Welding Flanges, Nominal Pressures PN Nos. 16, 25, 40, 64 E 29-284—287
Round Slip-on Flanges, Nominal Pressures PN Nos. 2, 5, 6 and 10 E 29-290
Different Types of Couplings for Lead, Iron and Copper Tubes, Nominal Pressure PN No. 10 E 29-532—537

GERMANY **DIN**

Hydrant Heads for Street Use 4055/6,-8
Street Outlets for Gas Mains, Types 1 to 5 3581-3585

NETHERLANDS **N**

Gas Appliances: Hose Nipples and Mouth-pieces 1273
Gas Appliances: Nipple for Connecting an Appliance to a Pressure Gas Meter 1571
Piping for Dairy Industry, General 1714

POLAND **PN**

Welded Oval Flanges H 74333
Welded Round Collar Flanges for Nominal Pressure 100 kg/sq. cm H 74336
Welded Round Collar Flanges for Nominal Pressure 6 kg/sq. cm H 74342
Slip-on Flanges H 74354
Syphon-Traps, Different Types H 75210—75218
Round Flanges, Rolled-in Type H 74324
Round Flanges with Collar, Rolled-in Type H 74325/6/7
Oval Flanges with Collar, Rolled-in type H 74328
Pipe Flanges, Round, Flat, Welding, NP 6-16 Kg/sq cm H 74331/2
Pipe Flanges, Screwed Type Nom. Press. 10-40 Kg/sq cm H 74318/9
Round Welding Neck Flanges NP 10-40 Kg/sq cm H 74337,-39
Welded Rings and Slip-on Flanges for Steel Pipes, NP 6-16 Kg/sq cm H 74344/5/6/7
Different Types of Welded Neck Flanged Pipes H 74349/0/1/2/3
Slip-on Flanges for Flared Pipes H 74357/8

RUMANIA **STAS**

Elbows, Tees, Crosses etc for Pipes Under 100 Kg/sq cm Pressure 1303/4/5/6
Pressure Regulators for Industrial Gases 1057
Gas Fittings, Cocks 1061
Seamless Steel Pipes for Petroleum Industry 715/6
Pipe Fittings for Oil Lines 825/6/7
45° and 90° Elbows for Oil Pipelines 830
Screwed Seamless Pipes and Couplings 876

UNION OF SOUTH AFRICA **SASS**

Water Taps 226-1950

628 Sanitary Technology and Engineering

FRANCE **NF**

Ceramic Urinals and Bowls D 11-115/6
Smoke Pipe, Sheet Iron D 35-302
Gas Heaters D 35-331

GERMANY **DIN**

Cleaning and Inspection Handholes 1392,B1.1-3
Drainage Installations and Fittings 4281

NEW ZEALAND **NZSS**

Code of Sanitary Plumbing and Drainage 671

631.3 Agricultural Tools and Machinery

FRANCE **NF**

Various Types of Light Plough Shares U 25-001 -008

POLAND **PN**

Test for Zinc Coating of Agricultural Implements E-04500

RUMANIA **STAS**

Ploughs for Animal Traction 1099

Book Reviews

Primary Batteries. By George W. Vinal. (John Wiley & Sons, Inc. 440 Fourth Avenue, New York 16, N. Y. $5.00)

The chairman of ASA Sectional Committee C40 on Storage Batteries presents in this book a history of primary batteries and describes new and unfamiliar types. Dry cells and their operation are described, one chapter being devoted to the currently important topic of their behavior at low temperature and the modifications that have been proposed to improve them. A comprehensive discussion is included of standard cells by which the unit of electromotive force is maintained and the commercial form of these cells widely used in electrical laboratories. A number of chapters deal with comparatively new types of primary batteries. The book closes with a brief chapter on fused electrolyte cells.

The author, a physicist at the National Bureau of Standards until his retirement, is chairman of Sectional Committee C40 and of Technical Committee 21 on Accumulators (Storage Batteries) of the United States National Committee, International Electrotechnical Commission.

Industrial Instrumentation. By Donald P. Echman. (John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. $5.00)

An introduction to the science of measurement, this book reviews the principles of the measurement methods employed in industrial processing and manufacturing. Manufacturers of industrial measuring equipment provided information for much of the operating data used. "Rapid development of new industrial methods and techniques has brought the subject of measurement into a science on its own physical foundation and has extended its scope far beyond the elementary concepts of temperature and pressure determinations," explains the Preface. "New measurement methods based on both new and old physical phenomena are becoming common in industrial operations." The ten chapters of the book cover qualities of measurement: expansion thermometers; thermoelectric temperature measurement; resistance thermometers; radiation temperature measurement; methods for composition analysis: mechanical measurements; measurement of pressure and vacuum; measurement of head and level; flowmetering; and process instrumentation.

Steel Castings Handbook. Prepared under the direction of the Handbook Committee, Steel Founders' Society of America. Charles W. Briggs, Technical & Research Director, SFSA, Editor. (Steel Founders' Society of America, 920 Midland Building, Cleveland 15, Ohio. $4.00)

Changes in production and technology in the steel industry which took place during World War II, as well as more recent developments are reported in this revision of a 1941 edition. The book is an attempt to provide authoritative answers to such questions as "What are the advantages of using steel castings in mechanical structures and assemblies? How can steel castings best serve the engineering industries?" It is intended to serve as a reference book and includes a history of the steel casting industry as well as an appendix giving the chemical compositions of standard steels. Sixteen chapters cover various phases of the steel casting industry, including commercial applications and industrial uses of steel castings, steel casting design, variables affecting the mechanical properties of steel castings, and physical values pertaining to cast steel.

Percy Good, CBE

His many friends in the United States will be deeply grieved to learn that Percy Good, director of the British Standards Institution, died December 2, 1950. Mr Good had served the British institution since 1913 when he became assistant director to the British Engineering Standards Association, as it was known at that time. He was made deputy director in 1929, and director in 1942.

Under his direction, the BSI has grown rapidly in scope and influence, and the value of its services has become more widely known year by year. It has played an influential role recently in the British government's studies of industrial methods to increase production.

Mr Good had a lively interest in the international aspects of standardization. It was soon after he became director that international conferences were held which later resulted in the British-American-Canadian Unified Screw Thread.

He was an important figure in the work that led to the International Organization for Standardization. As a member of the ISO Council, he took an active part in determining the policies on which the ISO is now operating.

In addition to his stature as one of the world's outstanding standardization executives, he had an international reputation as an electrical engineer. For many years he was secretary of the British National Committee of the International Electrotechnical Commission and is well known in electrical circles in the United States for his work with that group. His high reputation in this field was recognized in his election as president of the British Institution of Electrical Engineers in 1947. He had also served as president of the British Illuminating Engineering Society.

Mr Good's special interests and service lay in the illumination field. In 1931 when the International Commission on Illumination held its conference in England, he was responsible for the floodlighting of the important buildings throughout England—the first time floodlighting had been used on any large scale. During the war he served as chairman of the Joint Lighting Committee of the Ministry of Home Security and made important contributions to the development of special emergency lighting under air-raid conditions. For his services he was made a Commander of the Order of the British Empire.

His wide range of interests in scientific and educational development was evidenced in the fact that he was trustee of the Basic English Foundation, an Honorary Fellow of the Imperial College of Science and Technology, and a member of the executive committee of the National Physical Laboratory.

At a Memorial Service to Mr Good at St Martin-in-the-Fields, London, December 18, Mr Roger Duncalfe, chairman of the British Standards Institution, paid the following tribute:

"Percy Good had the finest qualities of mind and manner. He was inflexible in what he knew to be right. His quiet dignity, his courtesy, and his unassuming manner gave him a charm which was all his own."

Commenting on his contributions to the work of the British Standards Institution, Mr Duncalfe said: "He was sustained by a profound belief in the benefits which standardization could offer to the human race, and in the service which the BSI could render to the British nation. He had the clearest perception of how that service could best be given."

AMERICAN STANDARDS

Status as of January 12, 1951

Legend

Standards Council — Approval by Standards Council is final approval as American Standard; usually requires 4 weeks

Board of Review—Acts for Standards Council, gives final approval as American Standard; usually requires 2 weeks

Correlating Committees — Approve standards to send to Standards Council or Board of Review for final action; approval by correlating committee usually takes 4 weeks

Building

American Standards Just Approved—

Specifications for Gypsum Plastering, A42.1-1950 (Revision of A42.1-1946)
Specifications for Interior Lathing and Furring, A42.4-1950 (Revision of A42.1-1946)
Sponsors: American Institute of Architects; American Society for Testing Materials

In Correlating Committee—

Specifications for Structural Clay-Bearing Wall Tile, (Revision of ASTM C34-49; ASA A74.1-1950)
Specifications for Structural Non-Load-Bearing Tile (Revision of ASTM C56-49; ASA A76.1-1950)
Specifications for Structural Clay Floor Tile (Revision of ASTM C57-49; ASA A77.1-1950)
Methods of Sampling and Testing Brick (Revision of ASTM C67-44; ASA A82.1-1944)
Specifications for Gypsum (Revision of ASTM C22-41; ASA A49.1-1941)
Methods of Testing Gypsum and Gypsum Products (Revision of ASTM C26-42; ASA A70.1-1942)
Specifications for Gypsum Plasters (Revision of ASTM C28-40; ASA A49.3-1940)
Specifications for Gypsum Wall Board (Revision of ASTM C36-42; ASA A69.1-1942)
Specifications for Gypsum Lath (Revision of ASTM C37-42; ASA A67.1-1942)
Specifications for Gypsum Molding Plaster (Revision of ASTM C59-40; ASA A49.4-1940)
Specifications for Keene's Cement (Revision of ASTM C61-40; ASA A66.1-1941)
Specifications for Gypsum Sheathing Board (Revision of ASTM C79-42; ASA A68.1-1942)
Sponsor: American Society for Testing Materials

Withdrawal Being Considered by Board of Review—

Design for Joint Plates for Seven Inch Girder-Grooved and Guard Rails, E2-1923
Design for Joint Plates for Nine-Inch Girder-Grooved and Guard Rails, E3-1923
Design for Seven-Inch Girder-Grooved Rail, E4-1933
Design for Nine-Inch Girder-Grooved Rail, E5-1933
Design for Seven-Inch Girder Guard Rail, E6-1933
Design for Nine-Inch Girder Guard Rail, E7-1935
7-Inch 82 lb Plain Girder Rail and Splice Bars for Use in Paved Streets, E8-1933
7-Inch 92 lb Plain Girder Rail and Splice Bars for Use in Paved Streets, E9-1933
7-Inch 102 lb Plain Girder Rail and Splice Bars for Use in Paved Streets, E11-1933
Sponsor: American Transit Association

Submitted to ASA for Approval—

Pile Foundations and Pile Structures, A96
Sponsor: American Society of Civil Engineers

Reaffirmation Requested—

Specifications for Sieves for Testing Purposes (ASTM E11-39; ASA Z23.1-1939)
Sponsor: American Society for Testing Materials

Chemicals

In Correlating Committee—

Methods of Chemical Analysis of Yellow, Orange, Red, and Brown Pigments Containing Iron and Manganese (Revision of ASTM D50-36; ASA K44-1937)
Sponsor: American Society for Testing Materials

Consumer

In Board of Review—

Colorfastness to Light (AATCC 16-45) L14.53
Colorfastness of Acetate Rayons to Atmospheric Fumes (AATCC 23-46) L14.54
Resistance of Textiles to Mildew and Rot, and Evaluation of Textile Fungicides (AATCC 30-46) L14.55
Colorfastness to Perspiration (AATCC 15-45) L14.56
Colorfastness to Chlorine Bleaching (AATCC 3-42) L14.57
Colorfastness to Peroxide Bleaching (AATCC 29-45) L14.58
Water Resistance of Fabrics—Resistance to Hydrostatic Pressure (AATCC 18-41) L14.59
Resistance to Water Spray (AATCC 22-41) L14.60
Resistance to Absorption of Water During Immersion (AATCC 21-41) L14.61
Detection of Phototropism (AATCC 32-46) L14.62
Colorfastness to Pleating (AATCC 31-46) L14.63
Resistance of Textile Fabrics and Yarns to Insect Pests (AATCC 24-49) L14.64
Evaluation of Insect Pest Deterrents on Textiles (AATCC 28-49) L14.65
Specifications for Textile Testing Machines (ASTM D 76-49) L14.66
Methods of Testing and Tolerances for Knit Goods (ASTM D 231-46) L14.67
Definitions of Terms Relating to Textile Materials, L14.12 (Revision of ASTM D 123-48; ASA L14.12-1949)
Methods of Testing and Tolerances for Cotton Yarns, L14.13, (Revision of ASTM D 180-47T; ASA L14.13-1949)
Methods of Test for Asbestos Yarns, L14.18 (Revision of ASTM D 299-48T; ASA L14.18-1949)
General Methods of Testing Cotton Fibers, L14.23 (Revision of ASTM D 414-47T; ASA L14.23-1949)
Method of Test for Fiber Length of Wool, L14.32 (Revision of ASTM D 519-40; ASA L14.32-1949)
Methods of Testing and Tolerances for Single Jute Yarn, L14.34 (Revision of ASTM D 541-41; ASA L14.34-1949)
Methods of Testing and Tolerances for Glass Yarn, L14.36 (Revision of ASTM D 578-47T; ASA L14.36-1949)
Methods of Testing and Tolerances for Woven Glass Fabrics, L14.37 (Revision of ASTM D 579-47; ASA L14.37-1949)
Methods of Testing and Tolerances for Woven Glass Tapes, L14.38 (Revision of ASTM D 580-47; ASA L14.38-1949)
Methods of Testing and Tolerances for Woven Glass Tubular Sleeving and Braids, L14.39 (Revision of ASTM D 581-44; ASA L14.39-1949)
Methods of Testing Felt, L14.52 (Revision of ASTM D 461-47; ASA L14.52-1949)
General Methods of Testing Woven Textile Fabrics, L14.68 (Revision of ASTM D 39-39; ASA L5-1939)
Sponsors: American Society for Testing Materials; American Association of Textile Chemists and Colorists

Electrical

American Standards Just Published—

Test Code for Apparatus Noise Measurement, Z24.7-1950 $.50
Sponsor: Acoustical Society of America;

American Standards Just Approved—

Electrical Indicating Instruments, C39.1-1951 (Revision of C39.1-1949)
Sponsor: Electrical Standards Committee
Brushes for Electrical Machines, C64.-1950 (Revision of C64-1935)
Sponsor: National Electrical Manufacturers Association

In Board of Review—

Terminology for Piezoelectric Crystals (49 IRE 14.S1), ASA C16.17
Methods of Testing Vehicular Communications Receivers (49 IRE 16.S1), ASA C16.18
Methods of Testing Amplitude-Modulation Broadcast Receivers (48 IRE 17.S1), ASA C16.19
Methods of Testing For Effects of Mistuning and Downward Modulation, (49 IRE 17.S1), ASA C16.12a, Supplement to American Standard Methods of Testing Frequency Modulation Broadcast Receivers, (47 IRE 17.S1), ASA C16.12-1949
Methods of Measurement of Television Signal Levels, Resolution, and Timing of Video Switching Systems (50 IRE 23.S1), ASA C16.20
Sponsor: Institute of Radio Engineers

Submitted to ASA for Approval—

Sampling Electrical Insulating Oils, Method of Test (ASTM D 923-49; ASA C59.21)

Power Factor and Dielectric Constant of Electrical Insulating Oils of Petroleum Origin, Method of Test (ASTM D 924-49; ASA C59.22)

Gas Content of Insulating Oils, Method of Test (ASTM D 831-48; ASA C59.23)

Inorganic Chlorides and Sulfates in Insulating Oils, Method of Test (ASTM D 878-49; ASA C59.24)

Detection of Free Sulfur in Electrical Insulating Oils, Method of Test (ASTM D 981-48T; ASA C59.25)

Natural Block Mica and Mica Films Suitable for Use in Fixed Mica-Dielectric Capacitors, Specification for (ASTM D 748-49; ASA C59.26)

NEMA Standards for Laminated Thermosetting Products (Revision of C59.16-1949)

Method of Testing Sheet and Plate Materials Used in Electrical Insulation (Revision of ASTM D 229-46; ASA C59.13-1948)

Sponsor: American Society for Testing Materials

Audiometers for General Diagnostic Purposes, Z24.5

Sponsor: Acoustical Society of America

Rolled Threads for Screw Shells of Electric Lamp Holders and Lamp Bases

Sponsor: Electrical Standards Committee

Mechanical

In Correlating Committee—

Tolerances for Ball and Roller Bearings, B3.5

Sponsor: Mechanical Standards Committee

Specifications for Zinc Coated (Galvanized) Iron and Steel Sheets (Revision of ASTM A93-48T; ASA G8.2-1949)

Specifications for Seamless Copper Water Tube (Revision of ASTM B88-49; ASA H23.1-1949)

Specifications for Brass Wire (Revision of ASTM B134-49; ASA H32.1-1949)

Specifications for Leaded Red Brass (Hardware Bronze) Rods, Bars, and Shapes (Revision of ASTM B140-49; ASA H33.1-1949)

Sponsor: American Society for Testing Materials

Withdrawal Being Considered by Correlating Committee—

American War Standard Screw Threads of Truncated Whitworth Form, B1.6-1944

Sponsors: American Society of Mechanical Engineers; Society of Automotive Engineers

Mining

In Correlating Committee—

Tumbler Test for Coke (Revision of ASTM D 294-29; ASA K20.3-1936)

Sponsor: American Society for Testing Materials

Petroleum Products and Lubricants

American Standards Just Approved—

Test for Interfacial Tension of Oil Against Water by the Ring Method (ASTM D 971-50; ASA Z11.64-1950)

Test for Oxidation Stability of Lubricating Greases by the Oxygen Bomb Method (ASTM D 942-50; ASA Z11.65-1950)

Determination of Butadiene Content of Polymerization Grade Butadiene (ASTM D 973-50; ASA Z11.66-1950)

Test for Saponification Number of Petroleum Products by Potentiometric Titration (ASTM D 939-50; ASA Z11.67-1950

Test for Thermal Value of Fuel Oil; Z11. 14-1950 (Revision of ASTM D 240-39; ASA Z11.14-1939)

Test for Sulfur in Petroleum Products and Lubricants by Bomb Method; Z11.13-1950 (Revision of ASTM D 129-49; ASA Z11.13-1949)

Test for Existent Gum in Gasoline (Air Jet Evaporation Method); X11.36-1950 (Revision of ASTM D 381-49; ASA Z11. 36-1949)

Sponsor: American Society for Testing Materials

Photography

American Standards Just Published—

Procedure for Determining the Safety-Time of Photographic Darkroom Illumination, Z38.8.13-1950; $.25

Photographic Filing Envelopes for Storing Processed Photographic Films, Plates, and Papers, Z38.8.21-1950; $.25

Sponsor: Optical Society of America

In Board of Review—

Dimensions for Photographic Dry Plates (Inch Size), Z38.1.30 (Revision of Z38.1.30-1944)

Flash Synchronizing Equipment Bipost-Type Connecting Cord Ends and Pins, Z38.4.26

Flash Synchronizing Equipment Bayonet-Type Connecting Cord Ends and Pins, Z38.4.27

Sponsor: Optical Society of America

Safety

American Standard Just Approved—

Code for Ventilation and Safe Operation of Open-Surface Tanks, Z9.1-1951 (Revision of Z9.1-1941)

Sponsors: American Industrial Hygiene Association; American Society of Heating and Ventilating Engineers; National Association of Fan Manufacturers

In Correlating Committee—

Safety Code for Installing and Using Electrical Equipment in and About Coal Mines, M2.1 (Revision of M2-1926)

Sponsors: American Mining Congress; Bureau of Mines, U. S. Department of Interior

What's New on American Standard Projects

Stainless Steel Pipe and Fittings

Manufacturers of stainless steel pipe and fittings met with representatives of the chemical industry December 1 at the American Standards Association. They voted to request inclusion of Schedule 5S for lightweight stainless steel pipe and fittings in an American Standard. The conference was held under the auspices of a subcommittee of the Chemical Industry Correlating Committee of ASA.

For the past two years the principal stainless steel tube mills have been manufacturing Schedule 5S stainless steel pipe on order of du-Pont, Tennessee-Eastman, and other users in the chemical industry. This schedule was originally conceived at an informal meeting of the two industries held two years ago.

The December 1 meeting was called to review the experiences of the various companies using schedule 5S. There was mutual agreement at the conference between manufacturers and users that Schedule 5S stainless steel pipe is practical and that considerable tonnage of this material would be used for future construction in the chemical industry.

The schedule as recommended is shown in the table.

Thicknesses of Schedule 5S Pipe

Nom. Pipe Size (In.)	*Nom. Thickness (In.)*	*Nom. Pipe Size (In.)*	*Nom. Thickness (In.)*	*Nom. Pipe Size (In.)*	*Nom. Thickness (In.)*
½	0.065	2	0.065	5	0.109
¾	0.065	2½	0.083	6	0.109
1	0.065	3	0.083	8	0.109
1¼	0.065	3½	0.083	10	0.134
1½	0.065	4	0.083	12	0.165

Companies and organizations represented at the meeting were: Carbide and Carbon Chemicals Division of Union Carbide and Carbon Corp; E. I. du Pont de Nemours and Co; Hercules Powder Co; Colgate-Palmolive-Peet Co; American Cyanimid Co; American Viscose Corp; Eastman Kodak Co; General Chemicals Division of Allied Chemical and Dye Corp; Celanese Corporation of America; Tennessee-Eastman Corporation; Hydrocarbon Research Corp; M. W. Kellogg Co; Carpenter Steel Co; Steel and Tubes Div of Republic Steel Corp; Allegheny Ludlum Steel Corp; Ladish Co; Crane Co; Taylor Forge and Pipe Works; Robinson Corp; Tube Turns, Inc; Welding Fittings Corp; Walworth Company; Cornell and Underhill; American Iron and Steel Institute; Manufacturers Standardization Society of the Valve and Fittings Industry; ASA Sectional Committee B36 on Dimensions and Material of Wrought Iron and Wrought Steel Pipe and Tubing.

Electric Lamps, C78

Sponsor: Electrical Standards Committee

Subcommittee 2 on Electric Discharge Lamps—Because of the trend towards larger diameters and somewhat shorter lamps, the title of long-tube hot-cathode multiple burning fluorescent lamps has been changed to "instant start single pin hot-cathode fluorescent lamps." This was accomplished at recent meetings of the C78 sectional committee and subcommittee 2.

The C78 committee also decided to delete the words "series-burning" from the title of the cold-cathode lamp standards thus making their title, "cold-cathode fluorescent lamps."

At the subcommittee 2 meeting it was also suggested that the IES Guide for Electrical Measurements of Fluorescent Lamps be studied by the committee with a view towards recommending its adoption as American Standard. A copy of this document has been sent to members of this group for comment.

Subcommittee 3 on Fluorescent Starters—As a result of a recent meeting of this subcommittee third and fourth drafts of the Proposed American Standard Specification for Fluorescent Lamp Starters have been circulated to members. In discussing the proposed designation system, it was the consensus of the subcommittee that it would be desirable to set up a new nomenclature system, which would discourage the use of individual manufacturers' suffix and prefix letters and encourage the use of simpler ASA designations.

Small Tools and Machine Tool Elements, B5

Sponsors: Metal Cutting Tool Institute; Society of Automotive Engineers; National Machine Tool Builders' Association; American Society of Mechanical Engineers

The Proposed American Standard on Designation and Working Ranges of Surface Grinding Machines of the Reciprocating Table Type and Plain Cylindrical Grinding Machines has been approved by sectional committee B5 and sent to the sponsors for submission to ASA as an American Standard.

A new draft of the proposed American Standard for Inserted Blade Milling Cutters is now under consideration by Technical Committee 24.

Allowances and Tolerances for Cylindrical Parts and Limit Gages, B4

Sponsor: American Society of Mechanical Engineers

Z. R. Bliss, professor of engineering, Brown University, has been appointed chairman of sectional committee B4. Professor Bliss will reorganize the committee and undertake a review of the American Standard Limits and Fits for Engineering and Manufacturing, B4.1-1947.

Electrical Measuring Instruments, C39

Sponsor: Electrical Standards Committee

New drafts of definitions and a section on classifications and requirements for direct-acting electrical recording instruments have been circulated to members of subcommittee 2 on electrical recording instruments. This material is to be included in the Proposed American Standard for Electrical Recording Instruments, C39.2.

Model Laws and Ordinances, Z56—

At the November 28 meeting of the exploratory committee on model laws and ordinances, Z56, it was unanimously agreed that there was still a big job to be done in developing recommendations that might be the basis for legislative and administrative action by state and municipal agencies. A subcommittee was appointed to study this problem and make suggestions for changing the status of Z56 to that of a sectional committee. W. J. Donald of the National Electrical Manufacturers Association was named chairman of this subgroup. Other members are: Percy Bugbee, National Fire Protection Association; Brevard Crihfield, Council of State Governments; E. T. Cushee, Electric Light and Power Group; C. George Krueger, International Association of Industrial Accident Boards and Commissions; J. Marshall Mayes, U. S. Department of Commerce, Construction Division; Morgan Strong, American Municipal Association; Marcus Abramson, Association of Casualty and Surety Companies; Donald G. Vaughan, National Safety Council; Walter C. Voss, American Institute of Architects.

The report from this subcommittee, which will include recommendations concerning sponsorship and scope of the sectional committee, is expected following a meeting January 24.

Committee Z56 was authorized by the Standards Council in 1947 to study methods of bringing nationally recognized standards and codes and latest revisions into wider acceptance and use as the basis for state and local administration. Late in 1949, the committee was responsible for publication of a booklet—Nationally Recognized Standards and Codes in State Laws and Local Ordinances. In this pamphlet the present chaotic situation was discussed together with certain methods of solution, some now legal and others suggested. Excerpts from statutes of a number of states that have already provided legal methods were included.

Safety Code for Construction, Care and Use of Ladders, A14

Sponsors: American Society of Safety Engineers; National Association of Mutual Casualty Companies

Floyd E. Frazier, Industrial Safety Consultant, Accident and Fire Prevention Division, National Association of Mutual Casualty Companies has been named secretary of the A14 sectional committee. The committee plans to meet early this year to consider a revision of the Safety Code for Wood Ladders, Z14.1-1948. At that time it will also discuss the possibility of starting a companion document on light-weight metal ladders.

Standardization and Unification of Screw Threads, B1

Sponsors: American Society of Mechanical Engineers; Society of Automotive Engineers

The results of the meeting of the working committee TC-1 on screw threads of the International Organization for Standardization held in Zurich, Switzerland, September 25-27, 1950, were reported to the Standing Committee on Unified and American Screw Threads at a meeting in the Engineering Societies Building, New York, N. Y., November 9, 1950.

I. H. Fullmer, senior physicist, National Bureau of Standards, Washington, D. C., who is chairman of the standing committee, and who served as U. S. delegate to the Zurich meeting, reported that the delegates in Zurich discussed the research being undertaken by the National Physical Laboratory of Great Britain on strength of screw threads in small-size fasteners with various thread angles.

Mr Fullmer also discussed informally with British industry and military the question of extending American-British-Canadian unification of screw threads into the small sizes. British industry, he reported, was anxious to have unification expanded, but in one complete series only.

The subgroup on Unification of Numbered Sizes and Subcommittee No. 9 on Screw Thread Gages and Gaging also attended the November 9 meeting. R. G. Cummings, of the subgroup on Unification of Numbered Sizes, expressed the opinion that a survey of screw-thread users in American industry would have to be made before any proposal could be made on unification in the smaller sizes. E. J. Bryant, chairman of the sectional committee, suggested that a survey of tap sales would give the best index of the relative usage of the various sizes and that the sale of dies would give similar information on manufacturers who make their own taps.

SAVE THESE DATES!

You will want to attend the Second National Standardization Conference

Monday, Tuesday, and Wednesday
October 22, 23, 24.

Railroad Highway Grade Crossing Protection, D8

Sponsor: Association of American Railroads

The letter ballot of sectional committee D8 on revision of American Standard Railroad Highway Grade Crossing Protection, D8.1-1943, has been closed. The revision has been sent to the sponsor for submission to ASA for approval as an American Standard.

Safety Code for Industrial Sanitation, Z4

Sponsor: Federal Security Agency, U. S. Public Health Service

The first steps toward revision of the three standards under its jurisdiction were taken at a meeting of the Z4 committee, November 14. Subcommittees were formed to do the preliminary work for each of the following standards: Safety Code for Industrial Sanitation in Manufacturing Establishments, Z4.1-1935; Specifications for Drinking Fountains, Z4.2-1942; and Sanitary Privy (Supplement No. 108 to the Public Health Reports), Z4.3-1935. Three representatives of the U. S. Public Health Service were appointed to head these subcommittees. C. D. Yaffe, Division of Industrial Hygiene, is chairman of the Z4.1 subcommittee; William E. Holy, Division of Sanitation, heads Z4.2; and John B. Thomas, Division of Sanitation, is chairman of Z4.3.

The sectional committee agreed to expand the coverage of Z4.1 so that it would also apply to office buildings, mercantile establishments, and other places of permanent employment with the exception of domestic and agricultural employees.

The need for an additional standard to cover sanitary requirements on construction operations and temporary labor camps was recognized by the committee. A subcommittee was set up to work on this new standard, designated Z4.4. Ralph J. Van Derwerker of the Division of Sanitation, U. S. Public Health Service, was appointed chairman of the group.

Transformers, Regulators and Reactors, C57

Sponsor: Electrical Standards Committee

A letter ballot of the C57 sectional committee is now being circulated on the proposed revision of American Standard Guide for Loading Oil-Immersed Step-Voltage and Induction-Voltage Regulators, C57.35-1948. If it is approved, the standard will be sent to the sponsor for submission to ASA as an American Standard.

Color Code for Compressed Gas Cylinders and Pipe Lines

A meeting of the advisory committee on Colors for Compressed Gas Cylinders and Pipelines, MIL-STD-101, met November 8, 1950. This committee was appointed by the chairman of the general conference, October 10, 1950, to make recommendations on the proposal for a color marking system submitted by the Interdepartmental Standards Council (STANDARDIZATION, November 1950).

The advisory committee recommended that a sectional committee be organized to consider a revision of the American Standard Method of Marking Compressed Gas Cylinders to Identify Content, Z48.1-1942, including use of color for secondary

purposes other than the identification of content. The American Society of Mechanical Engineers was proposed as the sponsor.

The committee proposed that the part of the Military Standard dealing with marking of pipelines be referred to sectional committee A13, Schemes for Identification of Piping Systems. As in the case of the cylinders, color was recommended for secondary purposes only.

The minutes of this meeting have been sent to the organizations represented at the general conference and all the organizations that were invited to be represented but did not send delegates. If general agreement is expressed on the recommendations, these will be submitted to the Mechanical Standards Committee and the Safety Code Correlating Committee for action.

Small Tool and Machine Tool Elements, B5—

Sponsors: Metal Cutting Tool Institute; Society of Automotive Engineers; National Machine Tool Builders' Association; American Society of Mechanical Engineers

Work on a proposed standard for gaging of involute splines and involute serrations is making headway, according to a report by G. L. McCain. Mr McCain is chairman of Subcommittee I-A on Spline Gaging of Technical Committee No. 13 on Splines and Splined Shafts. The report of the work on gaging follows publication of up-to-date specifications for involute splines and involute serrations in the recently revised American Standards B5.15-1950 and B5.26-1950.

Subcommittee I-A has 35 members, including gage manufacturers, tool manufacturers, and users of parts having splines or serrations, Mr McCain reports. This subcommittee has developed a proposed standard which includes gage nomenclature; gagemaker's tolerances; and gage wear allowances in relation to the tolerances on the work; the variation of the gage tolerances with the diameter and diametral pitch of the work; and gaging methods. Methods of illustrating gage tolerances and tables of complete gage dimensions for splines having 6 to 50 teeth are still to be added, together with drawings of various gages.

Mr McCain invites suggestions from anyone interested. Information about the proposed standard can be obtained from G. L. McCain, Chrysler Corporation, Detroit 31, Michigan.

Letter Symbols and Abbreviations for Science and Engineering, Z10

Sponsors: American Association for the Advancement of Science; American Institute of Electrical Engineers; American Society of Civil Engineers; American Society of Mechanical Engineers; American Society for Engineering Education

The Air Materiel Command is attempting to coordinate standardization of symbols and nomenclature employed in its mathematical statement and solution of airplane and missile stabilization or guidance problems. A committee has been formed within the Engineering Division of the AMC to determine what action has been taken, or may be contemplated, by the interested professional societies in this connection.

The committee has contacted the American Institute of Electrical Engineers, the Institute of Aeronautical Sciences, and ASA. As this work coincides with that done by two Z10 subcommittees—Letter Symbols for Feedback Control Systems, and Letter Symbols for Aeronautical Sciences—ASA has invited the AMC to send representatives to attend future meetings of the Z10 committee and to work closely with these subcommittees.

In their letter the AMC explained that they do not attempt to specify any system of symbolism in their contracts with commercial firms and as a result they are confronted with a rather formidable task of interpretation upon receipt of engineering reports. This problem is closely related to that of the servomechanisms field except that the symbolism which is now widely used in servo work is not adaptable to systems with multiple inputs and outputs nor is there any generally accepted single system covering such expressions.

A further effort to secure correlation in this field is being instituted through the establishment of closer relationship with the High-Speed Aerodynamics and Jet Propulsion Writing Program at Princeton University. Detailed comparisons of the letter symbols used for primary aerodynamic concepts are being made in an effort to secure complete agreement between the guide being prepared at the University and the American Standard Letter Symbols for Aeronautical Sciences, Z10.7-1950.

Natonal Electrical Code, C1—

Sponsor: National Fire Protection Association

The sponsor is asking for nominations for members of two technical subcommittees just approved by the NFPA Correlating Committee on the National Electrical Code. One of these technical subcommittees is assigned responsibility for preparing proposed revisions relating to motion picture studios and similar locations. John E. Baldwin, Safety Manager, Association of Motion Picture Producers, Inc., Hollywood, California, has accepted chairmanship. The second technical subcommittee is on Installations, and is to report through Code-Making Panel No. 8. Suggestions for members of these two technical subcommittees should be sent to Alvah Small, chairman of the NFPA Electrical Section, 207 East Ohio Street, Chicago, Illinois.

VOLT METERS—AMMETERS—POWER FACTOR METERS—VARMETERS—FREQUENCY METERS

SINGLE PHASE AND POLYPHASE WATTMETERS—

NEW... NEW... NEW...

COMPREHENSIVE REQUIREMENTS FOR PORTABLE AND LABORATORY STANDARD INSTRUMENTS INTRODUCED IN AMERICAN STANDARD FOR ELECTRICAL INDICATING INSTRUMENTS. . . . C39.1-1951.

For the first time, standard requirements, tests, and definitions for portable and laboratory standard indicating instruments are presented in the new revised edition of American Standard for Electrical Indicating Instruments, C39.1-1951. Among the detailed and comprehensive requirements, presented in tabulated form for easy reference, are response time, external temperature influence, sustained operation influence, external field influence, frequency influence, and magnetic platform effect for instruments of rated accuracy 0.1, 0.25, 0.5, 1, and 2 percent.

Revisions in definitions, classifications, and test requirements on panel and switchboard indicating instruments have been made by a committee of top authorities in the country.

Whether user or manufacturer, make sure your instruments meet all standard requirements and tests with the new American Standard for Electrical Indicating Instruments, C39.1-1951. Send for yours today.

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